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(54) Title: IMPROVED MOBILE PAYMENT SYSTEM

(57) Abstract: A method for conducting a transaction with a mobile telephone subscriber who may or may not be authorized to use a mobile payment system, the method comprising: using an incoming call from a mobile telephone subscriber located at a point of sale equipped with a telemetry device to recognize the mobile telephone number from which the incoming call was made; searching for the mobile telephone number in a database of authorized users which comprises a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith; if the searched-for mobile telephone number is found in the database of authorized users, authorizing and conducting a sale; and if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including the following: prompting the user to supply particulars of his payment account; authorizing the payment account; and if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account and conducting a sale.

IMPROVED MOBILE PAYMENT SYSTEM

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to apparatus and methods for effecting payment using a mobile telephone.

10 Mobile payment systems are known. A state of the art mobile payment system is described in PCT Application No. PCT/IL00/00331 (WO 00/77697). The disclosures of all publications mentioned in the specification and of the publications cited therein are hereby incorporated by reference.

SUMMARY OF THE INVENTION

The present invention seeks to provide an improved mobile payment system suitable both for registered users and for still unregistered users.

20 There is thus provided, in accordance with a preferred embodiment of the present invention, a method for conducting transactions with a population of mobile telephone subscribers some of whom are not authorized to use a mobile payment system, the method including maintaining a database identifying mobile subscribers who are authorized to effect purchases via their mobile telephones and storing means of payment associated with each authorized mobile telephone subscriber, waiting in available status for initiation of a purchase session by a mobile telephone subscriber, reverting, upon initiation of a purchase session by an individual subscriber, to occupied status, accessing the database to determine whether or not the individual subscriber who has initiated contact is authorized to effect purchases via his mobile telephone and conducting a purchase transaction if the individual subscriber is so authorized, and, if the subscriber is not authorized to effect purchases via his mobile telephone, conducting
30 a registration process in order to add the subscriber to the database and conducting the purchase transaction, and subsequently terminating the session and returning to available status.

Further in accordance with a preferred embodiment of the present invention, conducting the purchase transaction includes refusing to effect a sale if the means of payment associated with the individual subscriber in the database is invalid.

Still further in accordance with a preferred embodiment of the present invention, refusing to effect a sale includes directing the individual subscriber to register anew within the same session, by presenting a means of payment other than the invalid means of payment currently associated with the individual subscriber in the database.

Also provided, in accordance with a preferred embodiment of the present invention, is a method for conducting a transaction with a mobile telephone subscriber
10 who may or may not be authorized to use a mobile payment system, the method including using an incoming call from a mobile telephone subscriber located at a point of sale equipped with a telemetry device to recognize the mobile telephone number from which the incoming call was made, searching for the mobile telephone number in a database of authorized users which includes a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith, and if the searched-for mobile telephone number is found in the database of authorized users, authorizing and conducting a sale, and if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including prompting the user to supply particulars
20 of his payment account, authorizing the payment account, and if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account and conducting a sale.

Further in accordance with a preferred embodiment of the present invention, the step of prompting includes prompting the user to insert his credit card into a magnetic card reader.

Also provided, in accordance with another preferred embodiment of the present invention, is a method for authorizing mobile telephone subscribers to use a mobile payment system, the method including using an incoming call from a mobile telephone subscriber located at a point of sale equipped with a telemetry device to recognize the
30 mobile telephone number from which the incoming call was made, searching for the mobile telephone number in a database of authorized users which includes a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith, and if the searched-for mobile telephone number is found in the database of authorized users, authorizing and

conducting a sale, and if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including prompting the user to supply particulars of his payment account, authorizing the payment account, and if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account.

Also provided, in accordance with another preferred embodiment of the present invention, is a system for conducting transactions with a population of mobile telephone subscribers some of whom are not authorized to use a mobile payment system, the system including a database identifying mobile telephone subscribers who are authorized to effect purchases via their mobile telephones and storing means of payment associated with each authorized mobile telephone subscriber, and a controller operative to cause the system to wait in available status for initiation of a purchase session by a mobile telephone subscriber, to revert, upon initiation of a purchase session by an individual subscriber, to occupied status, to access the database to determine whether or not the individual subscriber who has initiated contact is authorized to effect purchases via his mobile telephone and to conduct a purchase transaction if the individual subscriber is so authorized, and if the subscriber is not authorized to effect purchases via his mobile telephone, to conduct a registration process in order to add the subscriber to the database and conducting the purchase transaction, and subsequently to terminate the session and to return to available status.

Further in accordance with a preferred embodiment of the present invention, the controller is operative, in conducting the purchase transaction, to refuse to effect a sale if the means of payment associated with the individual subscriber in the database is invalid.

Still further in accordance with a preferred embodiment of the present invention, the controller is operative, in refusing to effect a sale, to direct the individual subscriber to register anew within the same session, by presenting a means of payment other than the invalid means of payment currently associated with the individual subscriber in the database.

Also provided, in accordance with yet another preferred embodiment of the present invention, is a system for conducting a transaction with a mobile telephone subscriber who may and may not be authorized to use mobile payment system, the system including a telephone number recognizer operative to recognize a mobile

telephone number from which an incoming call was made, a database of authorized users which includes a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith, a database searcher operative to search for the mobile telephone number in the database, and a sale conductor operative, if the searched-for mobile telephone number is found in the database of authorized users, to authorize and to conduct a sale and if the searched-for mobile telephone number is not found in the database of authorized users, to perform a user registration process including prompting the user to supply particulars of his payment account authorizing the payment account and, if the payment account is
10 authorized, generating an electronic record including the user's telephone number and particulars of the payment account and conducting a sale.

Further in accordance with a preferred embodiment of the present invention, prompting includes prompting the user to insert his credit card into a magnetic card reader.

Also provided, in accordance with another preferred embodiment of the present invention, is a method for authorizing mobile telephone subscribers to use a mobile payment system, the method including using an incoming call from a mobile telephone subscriber located at a point of sale equipped with a telemetry device to recognize the mobile telephone number from which the incoming call was made,
20 searching for the mobile telephone number in a database of authorized users which includes a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith, if the searched-for mobile telephone number is found in the database of authorized users, authorizing and conducting a sale, and if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including prompting the user to supply particulars of his payment account, authorizing the payment account, and if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account.

Further provided, in accordance with another preferred embodiment of the present invention, is a system for authorizing mobile telephone subscribers to use a mobile payment system, the system including a telephone number recognizer operative to recognize a mobile telephone number from which an incoming call was made, a database of authorized users which comprises a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment
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account associated therewith, a database searcher operative to search for the mobile telephone number in the database, and a sale conductor operative, if the searched-for mobile telephone number is found in the database of authorized users, to authorize and to conduct a sale and if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including prompting the user to supply particulars of his payment account, authorizing the payment account and, if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account.

10 Further in accordance with a preferred embodiment of the present invention, the step of conducting a registration process requires no subscriber input other than provision of payment.

Still further in accordance with a preferred embodiment of the present invention, provision of payment includes feeding of physical cash to, a physical cash accepting system.

Additionally in accordance with a preferred embodiment of the present invention, the physical cash accepting system includes a bill validator and/or a coin acceptor .

Still further in accordance with a preferred embodiment of the present invention, provision of payment comprises passing of a portable storage device storing the subscriber's account particulars through a pollable storage device reader.

20 Additionally in accordance with a preferred embodiment of the present invention, the pollable storage device comprises a magnetic card and the portable storage device reader comprises a magnetic card reader.

Still further in accordance with a preferred embodiment of the present invention, the portable storage device comprises a smart card and the portable storage device reader comprises a smart card reader.

Also provided, in accordance with a preferred embodiment of the present invention, is a method for registering mobile telephone subscribers for membership in a mobile payment system, the method including recognizing a caller-ID of a mobile telephone subscriber, accepting particulars identifying an account to be billed and
30 storing the particulars identifying the account to be billed in association with the caller ID.

Further provided, in accordance with a preferred embodiment of the present invention, is a mobile payment registration database for registering mobile telephone

subscribers for membership in a mobile payment system, the database including particulars identifying an account to be billed in association with the caller ID of the mobile telephone subscriber associated with the account to be billed.

In conventional mobile payment systems, the system is capable of interacting automatically with a mobile telephone subscriber, without intervention of any human other than the mobile telephone subscriber himself, only if the mobile telephone subscriber is pre-registered. Registration of mobile telephone subscribers, in conventional mobile payment systems, involves directing the mobile telephone subscribers, typically via a displayed message, to a human-manned or automated registration call center.

A particular feature of a preferred embodiment of the present invention is that registration and purchase are performed as a single task and the unit performing registration and purchase does not terminate its session with a current user and does not initiate a session with any other user, until the current user is registered and has completed his purchase, unless of course the current user terminates the session of his initiative. In contrast, in conventional systems, registration and purchase are separate tasks and if a mobile telephone subscriber approaches a point of sale and it is determined that he is not registered, the purchase interaction is terminated. The telephone subscriber must then register and then initiate an additional purchase interaction in the meantime, another subscriber may approach the point of sale and may occupy it such that the unregistered subscriber, even once registered, may find himself at the end of a queue which has formed in the course of his registration.

A particular feature of a preferred embodiment of the present invention is that at least some of the registration process, such as providing instructions to the user and checking the validity of the user's card is performed locally rather than by a remote call center.

It is appreciated that the methods shown and described herein effectively convert a mobile telephone into a mobile payment device thereby allowing any service provider or commodity provider networked to the database storing particulars elicited by the methods shown and described herein, to transact with the mobile telephone's subscriber.

It is appreciated that the term "purchase" as used herein is intended to include any transaction in which goods or services are exchanged for actual payment or a commitment to payment under specified conditions.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated from the following detailed description, given purely by way of example and taken in conjunction with the drawings and appendices in which:

Fig. 1 is a simplified flowchart illustration of a method for conducting transactions with a population of mobile telephone subscribers some of whom are not authorized to use a mobile payment system;

Fig. 2 is a simplified flowchart illustration of a method for implementing

10 the purchase transaction conducting step of Fig. 1;

Figs. 3A -3 B, taken together, form a simplified flowchart illustration of a preferred method for registering a mobile telephone subscriber within a mobile payment system useful for allowing a purchase session to terminate successful whether or not the subscriber is registered within the system;

Figs. 4A -4B, taken together, form a simplified flowchart illustration of a preferred method for effecting a purchase using a mobile payment system regardless of whether the subscriber is a registered user of the mobile payment system;

20 Fig. 5 is a simplified flowchart illustration of a preferred method for local verification of a credit card presented by a user of a mobile payment system;

Figs. 6A -6C, taken together, form a simplified flowchart illustration of a preferred method for operating a vending machine by credit card;

Fig. 7 is a simplified block diagram illustrating a preferred system configuration according to a preferred embodiment of the present invention;

Figs. 8-10 are a series of communication flows between a Vending Machine, a Telemetry Server and a Payment Server, around a transaction, according to a preferred embodiment of the present invention; and

Figs. 11 - 17 are a series of electronic diagrams including chip pin layout diagrams for building the telemetry device of the preferred embodiments.

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DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig 1 is a simplified flowchart illustration of a method for conducting transactions with a population of mobile telephone subscribers some of whom are not

authorized to use a mobile payment system. The method comprises a first stage 10 of maintaining a database identifying mobile telephone subscribers who are authorized to effect purchases via their mobile telephones. The database includes details of means of payment associated with each authorized mobile telephone subscriber such as details of his credit card account. The mobile telephone system itself provides a secure system of user identification intended to prevent users from making calls without charging their own accounts, and the mobile telephone login procedure can be used to advantage in the present embodiments in order to ensure that the credit card payment details are available only to the originating mobile telephone.

10 However, many users are not subscribed to the database and whilst their mobile telephones can be identified with certainty from the log-in procedure, their credit card or other payment details are simply not available to enable a transaction.

 The method then comprises waiting in an "available" status for system initiation by a remote user over his mobile telephone, stage 12 in Fig. 1. Such a system initiation may comprise a purchase session by a mobile telephone subscriber, perhaps due to a referral from a purchase session, say at a WAP site or the like where the subscriber wishes to purchase goods or services. In the following description, the example used is that of purchasing at a vending machine. A vending machine gives immediate delivery of the product and can be designed to include a card reader. However, the invention is
20 applicable to any point of sale (POS) and even, if the user's mobile telephone includes say a smart card reader or the like, then the system can work without a separate POS being involved.

 System initialization is generally carried out by the subscriber using his mobile telephone to contact a telemetry device located on a vending machine. The telephone call is a secure way of identifying the user since it uses secure signatures to identify the telephone and thus verifying the CLI or caller line identification.

 Upon initiation of such a purchase session by an individual subscriber, the method, in stage 14, involves reverting to occupied status. In the occupied state the method accesses the database to determine whether or not the individual subscriber who
30 has initiated contact is authorized to effect purchases via his mobile telephone. As mentioned, the subscriber is securely identified via his CLI, on the strength of the cryptographically strong cellular log-in system which prevents impostors from making use of CLIs that are not their own. If the subscriber is so authorized then the method carries out and completes the required purchase transaction. The user then passes his

credit card through a card reader on the vending machine, and the details are passed on to a telemetry server and to a payment server.

It is appreciated that whilst the method above described uses the concepts of waiting state and occupied state, the electronics that carries out the method may be constructed with sufficient capacity that in most circumstances, there is always spare capacity in the waiting state for any given caller.

If, on the other hand, the subscriber is not authorized to effect purchases via his mobile telephone, then the method moves to state 16, which involves conducting a registration process in order to add the subscriber to the database, only subsequently
10 conducting the purchase transaction.

Stage 18 involves subsequently terminating the session and returning to available status. In stage 18, the method terminates in one of two ways. Either the user terminates the session, which he is preferably able to do at any stage, or the purchase transaction is completed. In other embodiments maximum delays can be set at various stages which either produce error messages after which the session is terminated, or the time delays directly lead to ending of the session. In general the skilled person chooses the session ending procedure that maximizes user friendliness.

Reference is now made to Fig. 2, which is a simplified flowchart illustration of a method for implementing a purchase transaction, whether after prior registration as in
20 stage 14 of Fig. 1, or directly following registration as in stage 16. In general, just because a subscriber has an account with a credit card number is not sufficient to authorize a transaction. In stage 20 the method ensures that the payment means is valid, that is it may check whether the card number provided corresponds to a genuine account, or whether the account is currently authorized for the given amount, or any other aspect of the account that needs to be checked. In the event that the transaction is not authorized in stage 20, then a stage 22 is entered in which the subscriber is informed that his means of payment is not valid or not authorized for the particular transaction.

In stage 24, the user is then preferably invited to register again, within the same transaction session, by presenting an alternative means of payment, say a different credit
30 card or a debit card or the like.

Figs. 3A to 6 are a series of interrelated flow charts illustrating in greater detail the embodiment of Figs. 1 and 2. The starting point in Fig. 3A is arbitrarily selected at the point at which a transaction is refused because the subscriber is determined not to be authorized. In stages 26 and 28 the user is informed, using a screen message and voice

respectively, that he is not registered on the system, meaning there is no entry corresponding to the present subscriber in the database. In stages 30 and 40 the user is informed, by voice, screen message or preferably both, that he can use his credit card to create an account. He is instructed to enter his credit card number, or pass his credit card through the card reader at the vending machine or the like. The instructions preferably also inform the user that waiting a few seconds will cancel the procedure. In stage 50 a test is carried out to determine if credit card details have been entered. If not, then the procedure is aborted in stage 60 with a "Registration aborted" screen message.

The test of stage 50 is now described in greater detail with respect to Fig. 3B.

- 10 The recognition procedure passes to stage 80 in Fig. 3B, which tests the passing of the card against a delay, for example 12 seconds. If the card is passed but the time limit has already been exceeded, the registration procedure is aborted in stage 90, which is equivalent to stage 60 above. If the card is passed in time then the procedure advances to MCR recognition in Fig. 5. The MCR card recognition process is represented for simplicity in Fig. 3B by decision box 110 with a "yes" output for successful card or account recognition and a "no" output for a recognition failure. Recognition failure, which typically means that the credit card number has been entered incorrectly or the card reader has read a digit wrongly, leads in Fig. 3B to the screen message "Dial call center". Preferably the message is followed by a call center number that can be used.
- 20 In an alternative embodiment the procedure may return to stage 50 and the user given another chance to pass his card or enter the number, although it is not preferred to allow the user an unlimited number of chances without at least restarting the session.

- If the card recognition is successful then the system passes to stage 140, which is a waiting stage whilst the card, having been recognized, is authorized. The user may be provided with music or with voice, and with screen messages as desired. The messages may be to the vending machine or to his mobile telephone. In stage 150 a screen message, "registration in progress" is displayed. In stage 160 a registration request is forwarded to a payment server using GPRS or any other suitable protocol. If the registration request is not acceptable to the payment server, for example it comes
- 30 from an account type that does not allow such payments, then the registration request is refused and in step 190 an LCD message "you are not authorized" is displayed on the cellular telephone or the vending machine. If on the other hand the registration request is accepted then in stages 170 and 180, "registration complete" messages are produced visually and orally. The card is now accepted and processing returns to Fig. 3A.

Reference is now made to Figs. 4A and 4B, which, taken together, form a simplified flowchart illustration of a preferred method for effecting a purchase using a mobile payment system regardless of whether the subscriber is, at an initial stage, a registered user of the mobile payment system. The flow charts of Figs. 4A and 4B include the procedures in Figs. 3A and 3B so that certain of the stages in Figs. 4A and 4B have been discussed above. However previously the method was discussed from the system point of view and in Figs. 4A and 4B it is discussed from the user's point of view. In stage 300 a mobile telephone or other portable communication device obtains, typically from the vending machine, a message indicating a number to dial for a given product. The user selects or manually dials the number, a connection is made and the user is welcomed and asked to wait for confirmation, both using voice and screen messages, in stages 310 and 320. In stage 330 the user is given a voice message, information about the product or service available and/or music, as deemed appropriate for the system in question. The information may include offering the user a choice of different products at different prices or from which the user is able to make a selection, although the embodiment as illustrated delays the product choice until later. The user may then be asked to confirm the intended transaction. In stage 340 GPRS is used to send a payment request to the payment server and to carry out the validation procedure. As explained above, the validation procedure as a whole can lead to three possible outcomes, "no credit", "not registered", or registered and payment means valid, indicated by "yes" in the figure. In the event of a "no credit" result, a screen message indicating the same is issued to the mobile telephone or vending machine screen in stage 350. The user is then invited to renew registration, which includes registering with a new or different account. Similarly, if the user is not registered then he is invited to register. In both cases, processing proceeds to Fig. 3A. If payment is valid then the subscriber is able to select a product or service of interest in stage 370.

In stage 380, the subscriber is provided with a message, preferably but not necessarily voice, asking him to select a product or service. As mentioned it is possible to configure the system so that the product selection takes place prior to the payment request validation. The user is then given a certain time limit, say ten seconds, to select a product, in decision box 390. There are four possible results of the decision box, firstly a successful product selection indicated by "yes", secondly a time out, thirdly a cancel request from the user and fourthly a technical failure. In the case of cancellation or technical failure the user is sent a reassurance that his account has not been charged.

The reassurance may be in terms of both voice and screen messaging or one or the other as preferred, and is indicated as stages 400 and 416 for the cancellation and as 420 and 430 for the technical fault.

In the case of a “yes” result, the user is presented with a screen message confirming the transaction, thus the screen may indicate the name of the cardholder and the amount of the transaction. Optionally it may give details about the product or services being offered and may include, either directly or via a link, details about delivery and the like. Details about delivery may be necessary if the system is not being used with a vending machine. It will be appreciated that different mobile devices have different screen capacities, and vending machines may have different kinds of screen and different screen capacities. For example a third generation cellular telephone has far greater capacity for presenting on-screen information including graphics than the more traditional second generation devices, and preferred embodiments make full use of the enhanced screen capacity where available, to provide a user-friendly experience. That is to say the telemetry device can use third generation mobile technology if desired.

A voice message thanking the user for making the purchase may be provided in stage 460. The voice message may optionally include all of the information in the screen message of stage 450. If the messages are being sent to the telephone, as opposed to the vending machine, then one of the reasons for providing information both as voice and on screen is that some subscribers tend to keep the telephone close to the ear unless they are required to press buttons. They may thus miss the screen information. Other users may keep the screen in sight and thus fail to hear the voice messages. On the other hand, if the messages are being sent to the vending machine, where presumably the voice and screen are available to other persons in the vicinity, subscribers may feel uncomfortable that messages such as “no credit” are broadcast to the vicinity.

In the case of the “time out” result, processing branches to stage 440 in which the user is given an LCD message to say that the product has not been selected. Whichever result is achieved at decision box 390, processing eventually reaches wait box 470 and the system is exited or restarted. Optionally an exit buzzer is provided to indicate exit status to the user.

Fig. 5 is a simplified flowchart illustration of a preferred method for local verification of a credit card presented by a user of a mobile payment system. The card

is inserted in the card reader as described with respect to Fig. 3B and the magnetic stripe is read using magnetic character recognition MCR. Alternatively, if a card reader is not available then the card number and expiration date can be entered manually or in any other way. Thus if the card is a Smart Card then a suitable Smart Card handling system may be used for reading the card instead. In stage 500, the presence or absence of the card is checked. If the card is not detected then the user is informed in stage 510, a buzzer or other sound is played in stage 520 and a further time out test is carried out in stage 530. An example of a second time out delay is four seconds. If a card is entered before the timeout expires then processing returns to card recognition stage 500 and a further attempt is made to recognize the card. If the time limit expires without detection of a card then processing returns to Fig. 3B.

In the event of a "yes" outcome at decision box 500, the card type is checked in decision box 540. For example the method may check if the data on the strip is compatible with the system, or if the card has been issued by an organization with which the service provider can deal. In stage 550 the expiration date of the card is checked. In either of the decision boxes 540 and 550 a suitable message is generated on failure. Following successful local checking of the card type and the expiry date the processing returns to sending a request to the payment server, as discussed above.

Figs. 6A -6C, taken together, form a simplified flowchart illustration of a preferred method for operating a vending machine by credit card via the user's mobile telephone. In Fig. 6, the user operates a vending machine and is asked for payment. The user calls the vending machine using his mobile telephone, so that the vending machine obtains the number or otherwise makes a connection between the mobile telephone and the vending machine. The mobile telephone in stage 600 receives a messaging screen instructing him to pass his credit card through a card reader. The card reader is typically part of the vending machine, but may alternatively be part of his local device. The card reader carries out local card recognition as explained above in respect of Fig. 5. If the local recognition steps are unsuccessful, for example if the card is the wrong type or has expired, then processing passes to stage 710 in Fig. 6C and the user is sent a message indicating he is not authorized. If the recognition is successful, resulting in a yes outcome at stage 610, then the user is asked, both via voice and on screen to await confirmation, stages 620 and 630, and is then given information or music is played in stage 640.

Moving to Fig. 6C and a validation stage is carried out with the payment server in a stage 650. Possible outcomes are as described previously. There is an outcome for a problem with the card, an outcome for lack of credit and an outcome, labelled "yes" for card valid and funds available. In the event of the card being valid and funds being available, the user is asked by both voice and screen message to select the desired product, stages 660 and 670. Product selection is tested by the same selection or time out decision box 680 as was discussed above. Successful selection of a product leads to an acknowledgement, stages 690 and 700. A time out leads to an error message, stage 730 and a wait stage 740.

10 Another possible outcome of the product selection stage 680 is that product selection is cancelled, either actively by the user or due to technical failure. Fig. 6B shows the various message screens provided when exiting the procedure at various points in Fig. 6C. The procedure may be exited during account validation due to lack of credit, stage 750, due to a user cancellation, stage 780 and 770, or due to a technical failure, stages 790 and 800.

 According to a preferred embodiment of the present invention, the caller's ID is identified from each incoming call using an automatic CLI (caller identification) feature without the system actually answering the incoming call. Alternatively, the incoming call may actually be answered. The system shown and described herein is particularly
20 useful in conjunction with the Hellotech Telemetry Device and Hellotech Telemetry Server commercially available from Hellotech Technologies Ltd., 3 Hilazon St., Ramat Gan, 972 3 612 7447 and described on Internet at www.hellotech.co.il, and also in conjunction with the methods and systems for remote purchase payments shown and described in PCT/IL00/00331 (WQ 00/77697), inventor Simon Prisant, the disclosure of which is incorporated herein by reference.

 Reference is now made to Fig. 7, which is a simplified block diagram illustrating a system configuration for a preferred embodiment of the present invention. A subscriber 900 wishes to obtain goods from a vending machine 910. The vending machine is equipped with a telemetry device 920 which serves as a mobile telephone
30 number recognition device, and the user is equipped with a mobile telephone 930 and a credit card (not shown). The telemetry device includes telephony capability, preferably cellular capability since cellular telephony includes verification. The telemetry device is able to communicate using general packet radio service (GPRS) technology and via GSM or whatever other cellular infrastructure is available, to a telemetry server 940 and

a payment server 950. The payment server is connected to a subscriber database 960 having a listing of registered users. The database preferably matches a given CLI to a credit card number or like account. The payment server is also connected to a billing system 970, allowing the payment server to debit the accounts identified in the database. The payment server may also be connected to a prepaid unit 980 allowing prepaid cards of various kinds to be used in the system. The payment server thus provides a sale conductor for the system.

Use of the system of Fig. 7 is according to the various flow charts of Figs 1-6C. The subscriber 900 passes his card through the card reader on the vending machine 910, after he has called the telemetry device 920 on the vending machine. The vending machine performs preliminary validation of the card and then contacts a payment server to check whether the user identified by the CLI is registered with the card information provided. If the subscriber is authorized then the subscriber is offered the products, and makes his payment to complete the transaction. If the subscriber is not registered then he is given an opportunity to subscribe. If the subscriber is registered but there are problems with the card number or his credit rating then he is given the opportunity to reregister with a different card.

In the typical case of a credit or like card, the stage of conducting a registration process requires no subscriber input other than provision of payment. In other embodiments provision of payment may require the user to insert physical cash to a physical cash accepting system.

The physical cash accepting system may include a bill validator and/or a coin acceptor.

In an embodiment, provision of payment comprises passing of a portable storage device storing the subscriber's account particulars through a portable storage device reader. The portable storage device reader may itself be portable and belong to the user, or it may be associated with a point of sale system.

Preferably, the portable storage device comprises a magnetic card and said portable storage device reader comprises a magnetic card reader.

In one embodiment, the portable storage device comprises a smart card and the portable storage device reader comprises a smart card reader.

There now follows a description of a preferred GPRS registration apparatus, useful in implementing the methods of Figs. 1 A -5. The following is in fact a more detailed description of Fig. 7.

Architecture

The telemetry device (TD) uses a mini operating system based on embedded Linux. The application software written for the TD has been written in the C, C++ programming language.

The TD has been designed to achieve the following criteria:

10 Total system reliability –hardware and software.

Hardware: The TD uses a plug-in CPU board based in an industrial embedded microprocessor, ideal for high reliability requirements.

Software: Linux OS used with high reliability and industrial applications.

Hardware software flexibility to support a wide range of control and monitoring applications.

Optional CPU board features: Ethernet connectivity, expandable RAM and flash memory. These features can be easily added to the TD if customers require them.

Remote upgrade and remote configuration.

Low price.

20 Minimal size

Ease of installation and maintenance

Maximum flexibility in utilizing communications devices (GSM/GPRS module)

Low power requirements

TCP/IP stack

All of the above are integrated in one compact enclosure.

Supervisory process

The TD uses a combination of hardware and software to supervise and correct unusual faults of the system.

30 The hardware watchdog timer can reset the system independent from the software unless the supervisory program takes interrupts it every TBD seconds. This feature assures that any software crash can be recovered within fractions of a second.

A task program records all the event processes of the system as part of supervisory testing. This program saves and reports unusual events and alerts.

Physical dimensions

Metal enclosure plus side panels plus cables

Approximate size 140 X 108 X 50mm (excluding cables)

SIM

The SIM holder is located inside the TD enclosure. The removal of the SIM card will require pushing a yellow button on the side panel and pulling the SIM out.

10 Interfaces

Antenna

Our telemetry device uses an external Antenna, the plug of the antenna is connected to the TD enclosure side panel using its cable. This antenna conforms to the standard Cellular Network "RF Specifications".

Electrical Interfaces

Button Side

J1 – I/O (25 Pin)

J2 – J4 – MDB/EXE (15 Pin)

20 J3 – ANT

Top Side

J5 – Ethernet (option)

J6 – USB (option)

J7 – VGA (option)

J8 – Keyboard (option)

J9 – Mouse (option)

Power

30 The input voltage of the telemetry device is:

DC 8V – 40V

AC 8V – 24V

Indicators

The telemetry device includes 3 LEDs

LED 1 indicates the Power ON

LED 2 indicates System Ready

LED 3 indicates Modem has power, when it flashes indicates that there is communication.

TD Safety

Reverse Polarity

- 10 The input power can work in either connection polarity of the power supply since the TD supports both AC and DC automatically on the same pins.

Transient/Over-current

The system has a filter that protect from Over-current

System Highlights

- Full-featured embedded PC
- AMD ElanSC520 CPU. Pentium™ class, 133MHz, 16KB cache, FPU
- 16 – 64 Mbyte SDRAM
- 20 • 1 – 256 Mbyte Flash Disk on-board
- VGA/XGA graphics controller for LCD and CRT (optional) Low Power consumption
- Sound sub-system with speaker and microphone support (optional)
- USB support (optional)
- 2 to 4 COM ports, LPT port, I/O ports, hard and floppy disk controllers, PST/AT Keyboard controller
- 10/100BaseT Ethernet port (optional)

The following is a description of a preferred GSM/GPRS interface between a telemetry device implementing any of the methods of Figs. 1A -5, and between the telemetry and payment servers described in the immediately preceding section.

The section describes the HTTP interface between the HelloTech telemetry device, the telemetry server and the XXXXX Payment Server. Furthermore, possible transaction paths are presented.

Three types of HTTP messages are distinguished: authorization, settlement and settlement confirmation.

10 Processing of HTTP requests

Basic flow

The basic flow for one request is:

- The client (telemetry device) sends an HTTP post request that contains the parameters in its body to the payment server.
- The payment server handles HTTP requests by means of a servlet. This servlet accepts an HTTP post-message containing parameters. Using these parameters, a payment server request is created and a RMI/IIOP call is performed towards the payment server core.
- The servlet sends an http response that includes a text document in its
20 body. The text document consists of a number of lines. Each line contains a name value pair.

Security

To protect the communications channels between the telemetry device/telemetry server and the payment server against security threats, the following measures are taken:

Threat	Solution
Interception of Data	The timestamp of each request should be more recent than the last received timestamp for the corresponding device
Replay	The timestamp of each request should be more recent than the last received timestamp for the corresponding device
Denial of Service	The payment server will check for each request if the timestamp falls within the time window [current time - δ , current time + δ]

Interception of data

Encryption of the HTTP-request

Note 1 : RQ stands for request

Note 2 : For the moment the same encryption key will be used for all TD's and TS's

Encryption of the HTTP - reply

The contents of the reply is currently stored in the body of the HTTP-message as plain text. For an authorization reply this could be:

Replay

The timestamp of each request should be more recent than the last received timestamp for the corresponding device (TD) or (TS). This check puts a condition on the resolution of the timestamp. If a device would send two consecutive requests within the same timestamp, the second one will be rejected.

A resolution of one second is enough for requests coming from the vending machine (authorization and settlement), but the timestamp of the Telemetry Server should have a more fine-grained resolution because multiple requests can be sent to the Payment Server within a period of one second. (to be defined)

Denial of service

The check if the timestamp of a request falls within the time window [current time - δ , current time + δ] can be considered as a precautionary measure against DoS attacks, but requires a synchronization of the TD- and TS- clocks.

Transaction Flow

The following transaction flows are presented:

- Purchase Request VM-TS-PS Fig. 8
- Reversal Request VM-TS-PS after timeout on VM Fig. 9
- Reversal Request VM-TS-PS after GPRS network failure and timeout on VM – Fig. 10.
- Reversal Request VM-TS-PS after bad pincode validation – Not included.

30

Figs 11- 17 are a set of electronic diagrams including chip pin diagrams, which together form a preferred hardware implementation of the telemetry device of the present embodiments as discussed above.

The system shown and described herein is also particularly useful in conjunction with a telemetry device connected to an information network such as the Internet via a wireless connection such as via a GPRS connection or a CDMA connection or a wLAN connection.

It is appreciated that the software components of the present invention may, if desired, be implemented in ROM (read-only memory) form. The software components
10 may, generally, be implemented in hardware, if desired, using conventional techniques.

It is appreciated that the particular embodiments described in the Appendices are intended only to provide a detailed disclosure of the present invention and are not intended to be limiting.

It is appreciated that various features of the invention which are, for clarity, described in the contexts of separate embodiments may also be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the context of a single embodiment may also be provided separately *or* in any suitable subcombination.

It will be appreciated by persons skilled in the art that the present invention is
20 not limited to what has been particularly shown and described hereinabove. Rather, the scope of the present invention is defined only by the claims that follow:

CLAIMS

1. A method for conducting transactions with a population of mobile telephone subscribers some of whom are not authorized to use a mobile payment system, the method comprising:
 - maintaining a database identifying mobile telephone subscribers who are authorized to effect purchases via their mobile telephones and storing means of payment associated with each authorized mobile telephone subscriber;
 - 10 waiting in available status for initiation of a purchase session by a mobile telephone subscriber;
 - upon initiation of a purchase session by an individual subscriber, reverting to occupied status, accessing the database to determine whether or not the individual subscriber who has initiated contact is authorized to effect purchases via his mobile telephone and conducting a purchase transaction if the individual subscriber is so authorized;
 - if the subscriber is not authorized to effect purchases via his mobile telephone, conducting a registration process in order to add the subscriber to the database and conducting the purchase transaction; and
 - 20 subsequently terminating the session and returning to available status.
2. A method according to claim 1 wherein conducting the purchase transaction comprises refusing to effect a sale if the means of payment associated with the individual subscriber in the database is invalid.
3. A method according to claim 1 wherein refusing to effect a sale comprises directing the individual subscriber to register anew within the same session, by presenting a means of payment other than the invalid means of payment currently associated with the individual subscriber in the database.
- 30 4 A method for conducting a transaction with a mobile telephone subscriber who may or may not be authorized to use a mobile payment system, the method comprising:
 - using an incoming call from a mobile telephone subscriber located at a

point of sale equipped with a telemetry device to recognize the mobile telephone number from which the incoming call was made;

searching for the mobile telephone number in a database of authorized users which comprises a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith;

if the searched-for mobile telephone number is found in the database of authorized users, authorizing and conducting a sale; and

10 if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including the following;

prompting the user to supply particulars of his payment account;

authorizing the payment account; and

if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account and conducting a sale.

5. A method according to claim 3 or claim 4 wherein said step of prompting comprises prompting the user to insert his credit card into a magnetic card reader.

20 6. A method for authorizing mobile telephone subscribers to use a mobile payment system, the method comprising:

using an incoming call from a mobile telephone subscriber located at a point of sale equipped with a telemetry device to recognize the mobile telephone number from which the incoming call was made;

searching for the mobile telephone number in a database of authorized users which comprises a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith;

30 if the searched-for mobile telephone number is found in the database of authorized users, authorizing and conducting a sale; and

if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including the following:

prompting the user to supply particulars of his payment account;

authorizing the payment account; and

if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account.

7. A system for conducting transactions with a population of mobile telephone subscribers some of whom are not authorized to use a mobile payment system, the system comprising:

a database identifying mobile telephone subscribers who are authorized to effect purchases via their mobile telephones and storing means of payment associated with each authorized mobile telephone subscriber; and a controller operative

10 to cause the system to

wait in available status for initiation of a purchase session by a mobile telephone subscriber,

upon initiation of a purchase session by an individual subscriber, to revert to occupied status, to access the database to determine whether or not the individual subscriber who has initiated contact is authorized to effect purchases via his mobile telephone and to conduct a purchase transaction if the individual subscriber is so authorized;

20 if the subscriber is not authorized to effect purchases via his mobile telephone, to conduct a registration process in order to add the subscriber to the database and conducting the purchase transaction; and

subsequently to terminate the session and to return to available status.

8. A system according to claim 7 wherein the controller is operative, in conducting the purchase transaction, to refuse to effect a sale if the means of payment associated with the individual subscriber in the database is invalid.

9. A system according to claim 7 wherein the controller is operative, in refusing to effect a sale, to direct the individual subscriber to register anew within the same session, by presenting a means of payment other than the invalid means of payment currently associated with the individual subscriber in the database.

30

10. A system for conducting a transaction with a mobile telephone subscriber who may and may not be authorized to use a mobile payment system, the system comprising:

a telephone number recognizer operative to recognize a mobile telephone number from which an incoming call was made;

a database of authorized users which comprises a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith;

10 a database searcher operative to search for the mobile telephone number in the database; and

a sale conductor operative, if the searched-for mobile telephone number is found in the database of authorized users, to authorize and to conduct a sale and if the searched-for mobile telephone number is not found in the database of authorized users, to perform a user registration process including prompting the user to supply particulars of his payment account, authorizing the payment account and, if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account and conducting a sale.

11. A system according to claim 10 wherein prompting comprises prompting
20 the user to insert his credit card into a magnetic card reader.

12. A system for authorizing mobile telephone subscribers to use a mobile payment system, the system comprising.

a telephone number recognizer operative to recognize a mobile telephone number from which an incoming call was made;

a database of authorized users which comprises a multiplicity of records, each record including a mobile telephone number of an authorized user and particulars of a payment account associated therewith;

30 a database searcher operative to search for the mobile telephone number in the database; and

a sale conductor operative, if the searched-for mobile telephone number is found in the database of authorized users, to authorize and to conduct a sale and if the searched-for mobile telephone number is not found in the database of authorized users, performing a user registration process including prompting the user to supply particulars

of his payment account, authorizing the payment account and, if the payment account is authorized, generating an electronic record including the user's telephone number and particulars of the payment account.

13. A method according to claim 1 wherein said step of conducting a registration process requires no subscriber input other than provision of payment.

14. A method according to claim 13 wherein provision of payment comprises feeding of physical cash to a physical cash accepting system.

10

15. A method according to claim 14 wherein said physical cash accepting system comprises at least one of the following groups:

a bill validator; and

a coin acceptor.

16. A method according to claim 14 wherein provision of payment comprises passing of a portable storage device storing the subscriber's account particulars through a portable storage device reader.

20

17. A method according to claim 16 wherein said portable storage device comprises a magnetic card and said portable storage device reader comprises a magnetic card reader.

18. A method according to claim 16 wherein said portable storage device comprises a smart card and said portable storage device reader comprises a smart card reader.

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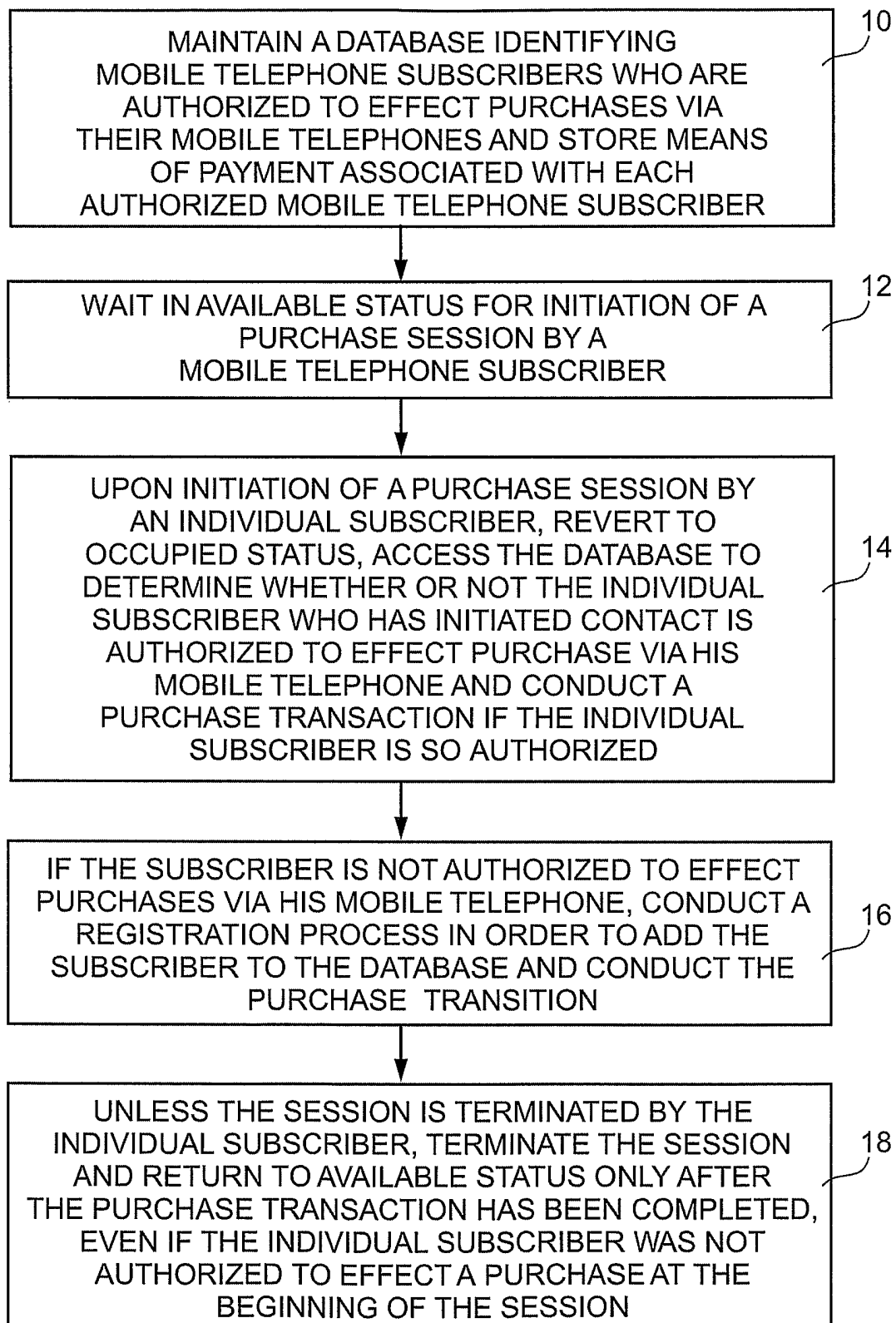


Fig. 1

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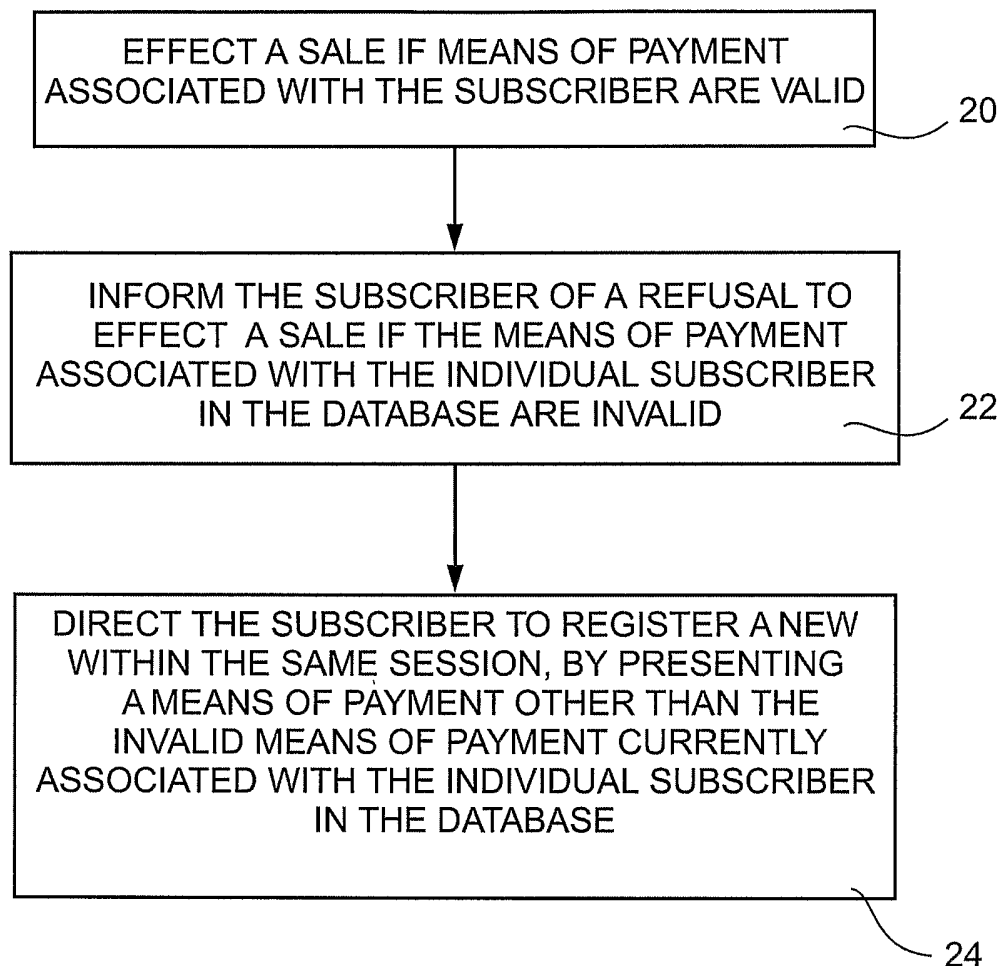


Fig. 2

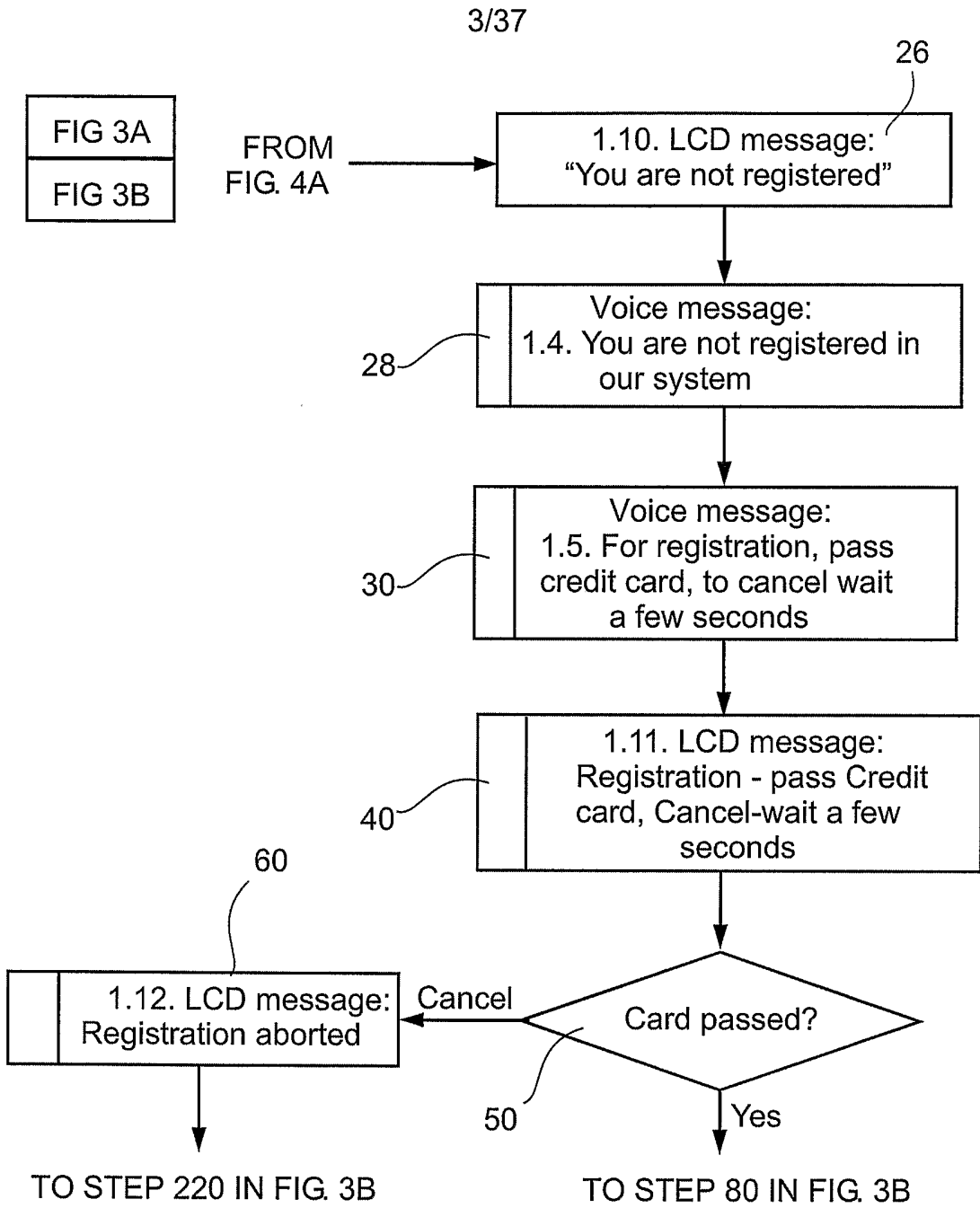
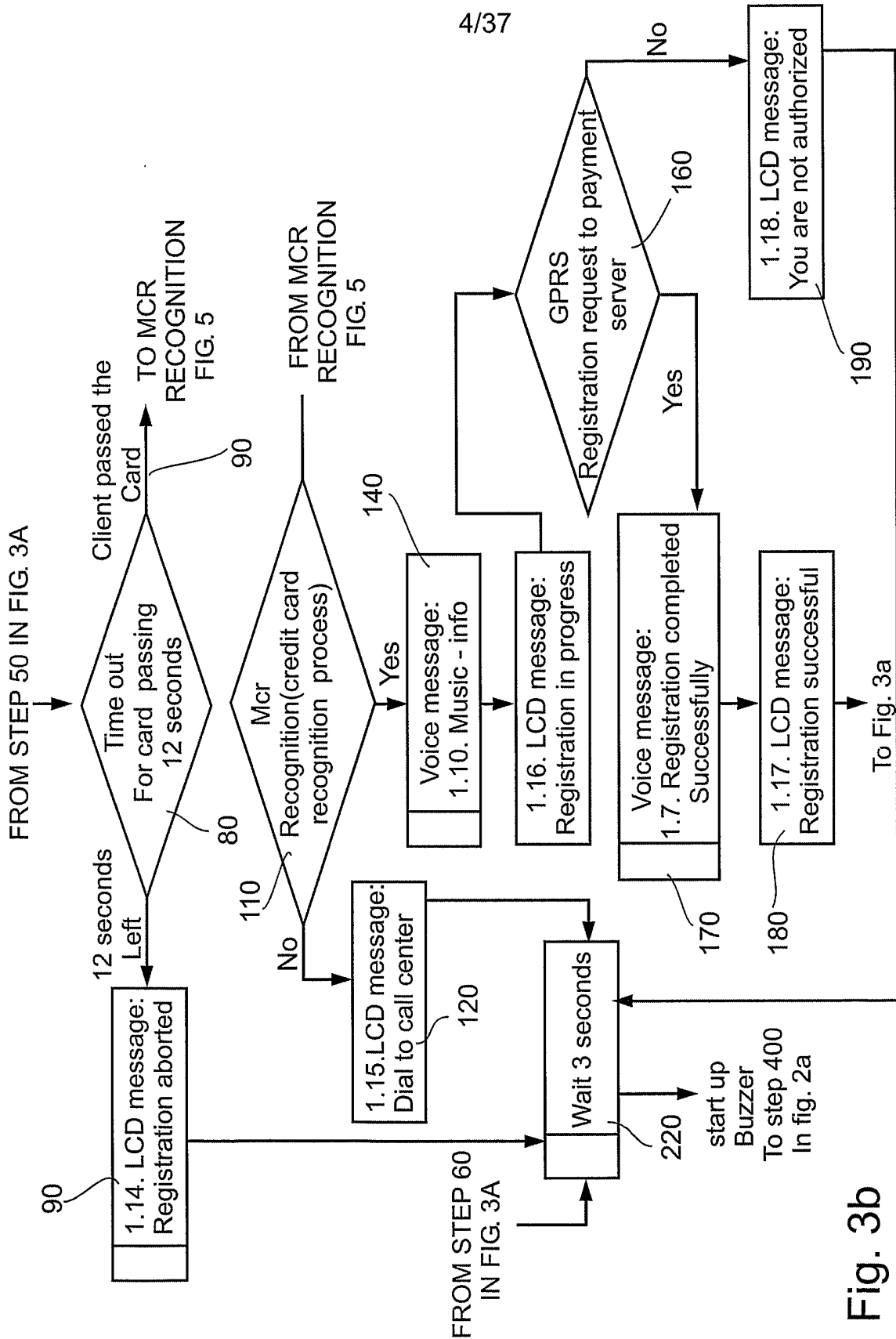


Fig. 3a



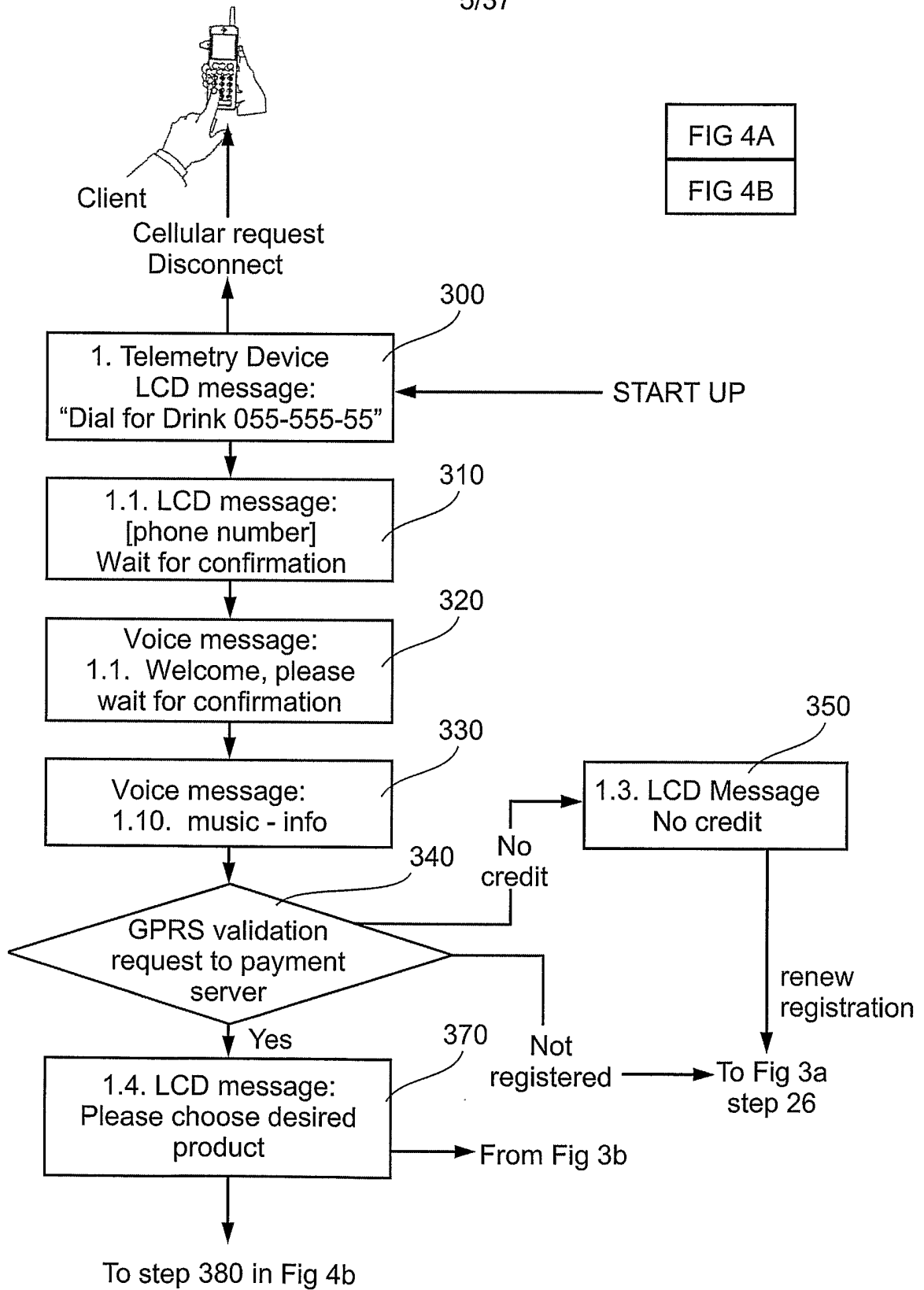
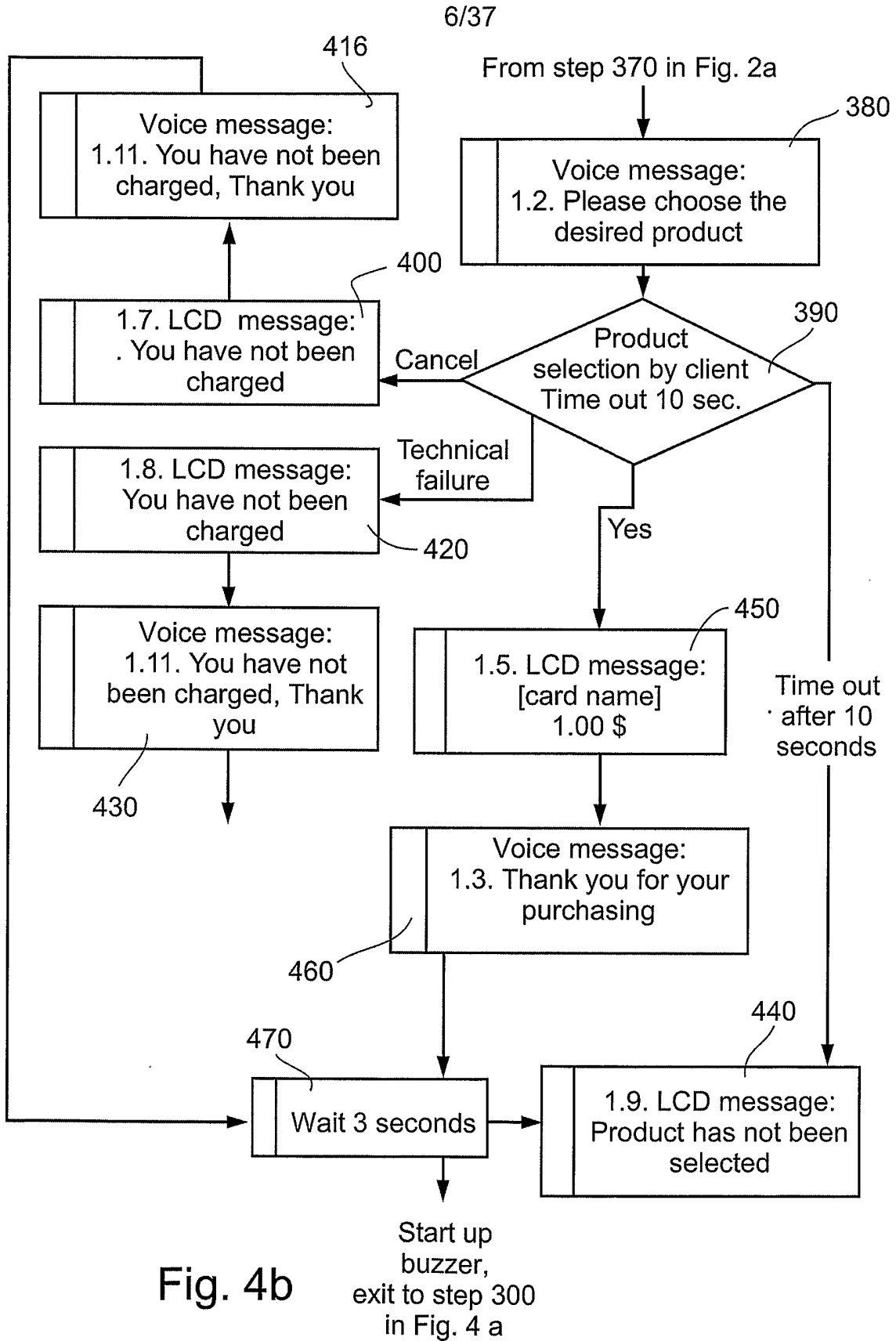


FIG 4A
FIG 4B

Fig. 4a



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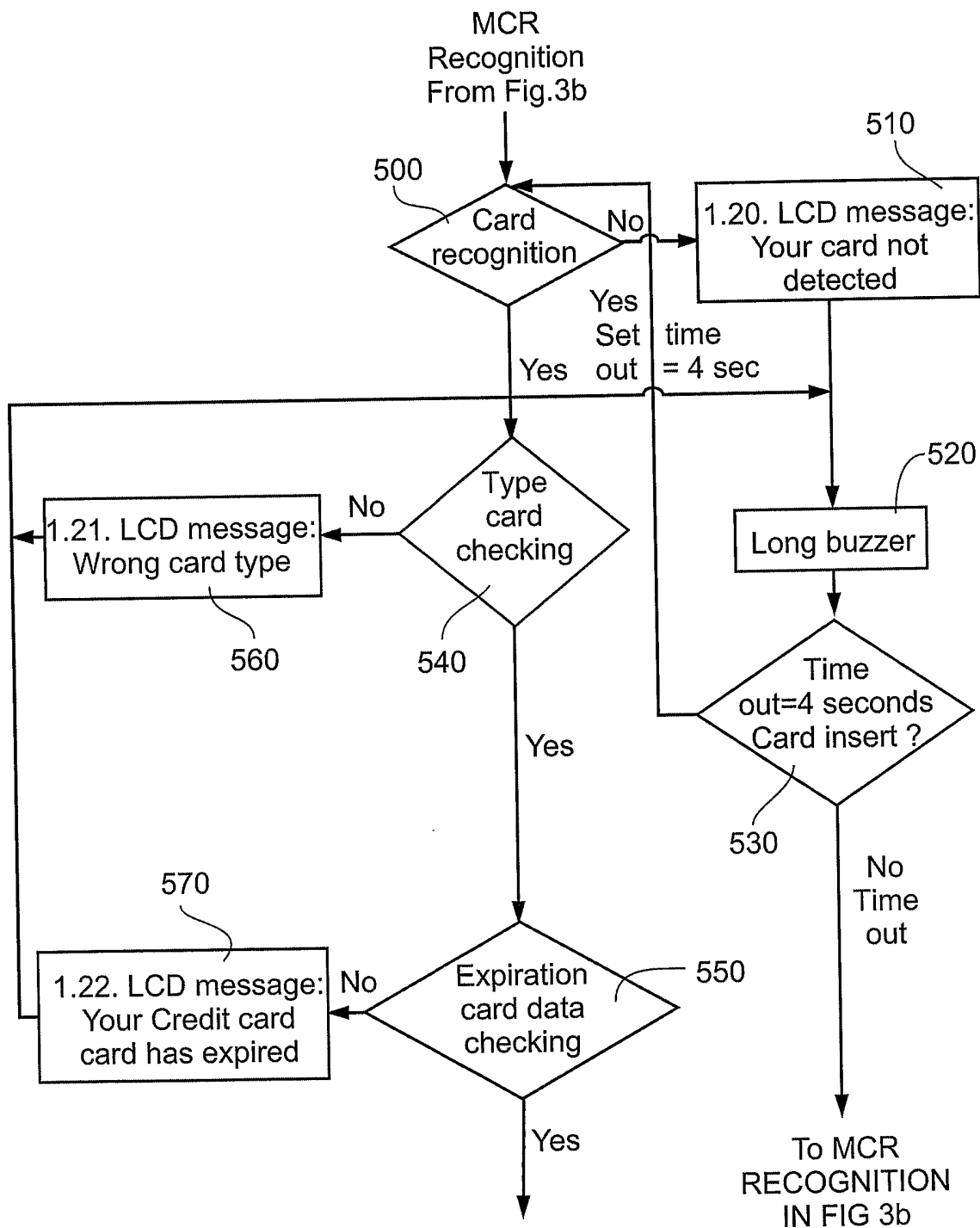


Fig. 5

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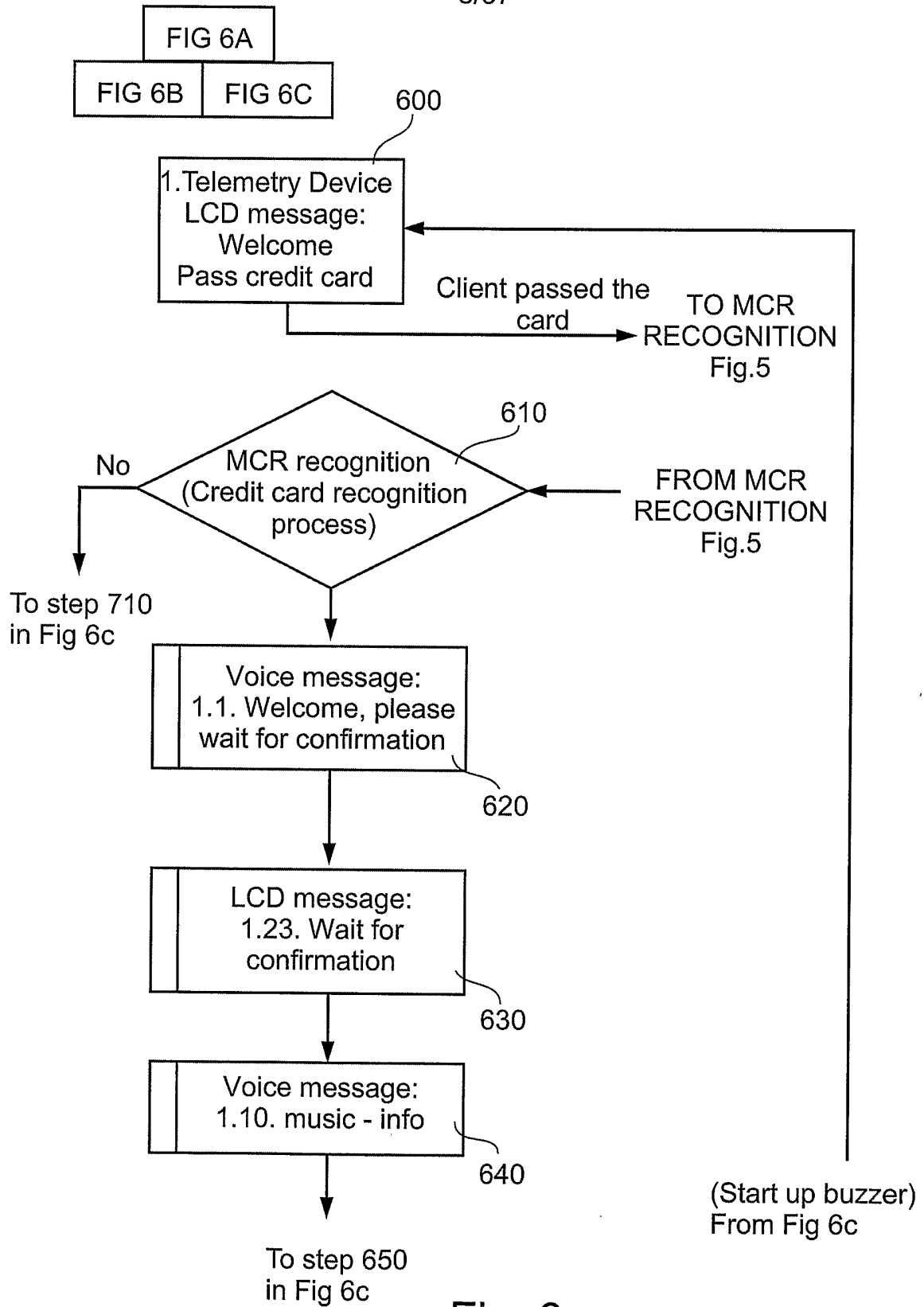


Fig. 6a

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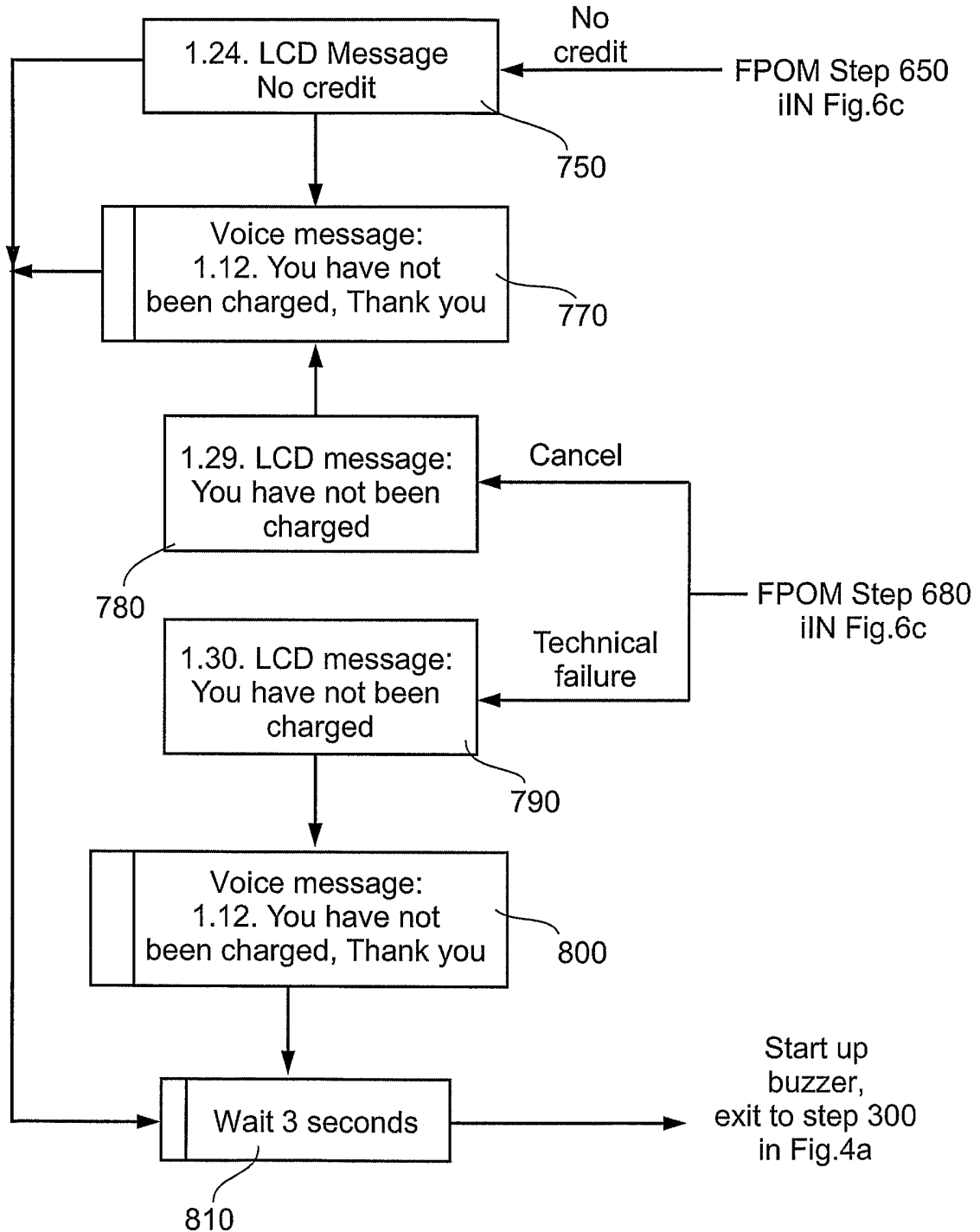


Fig. 6b

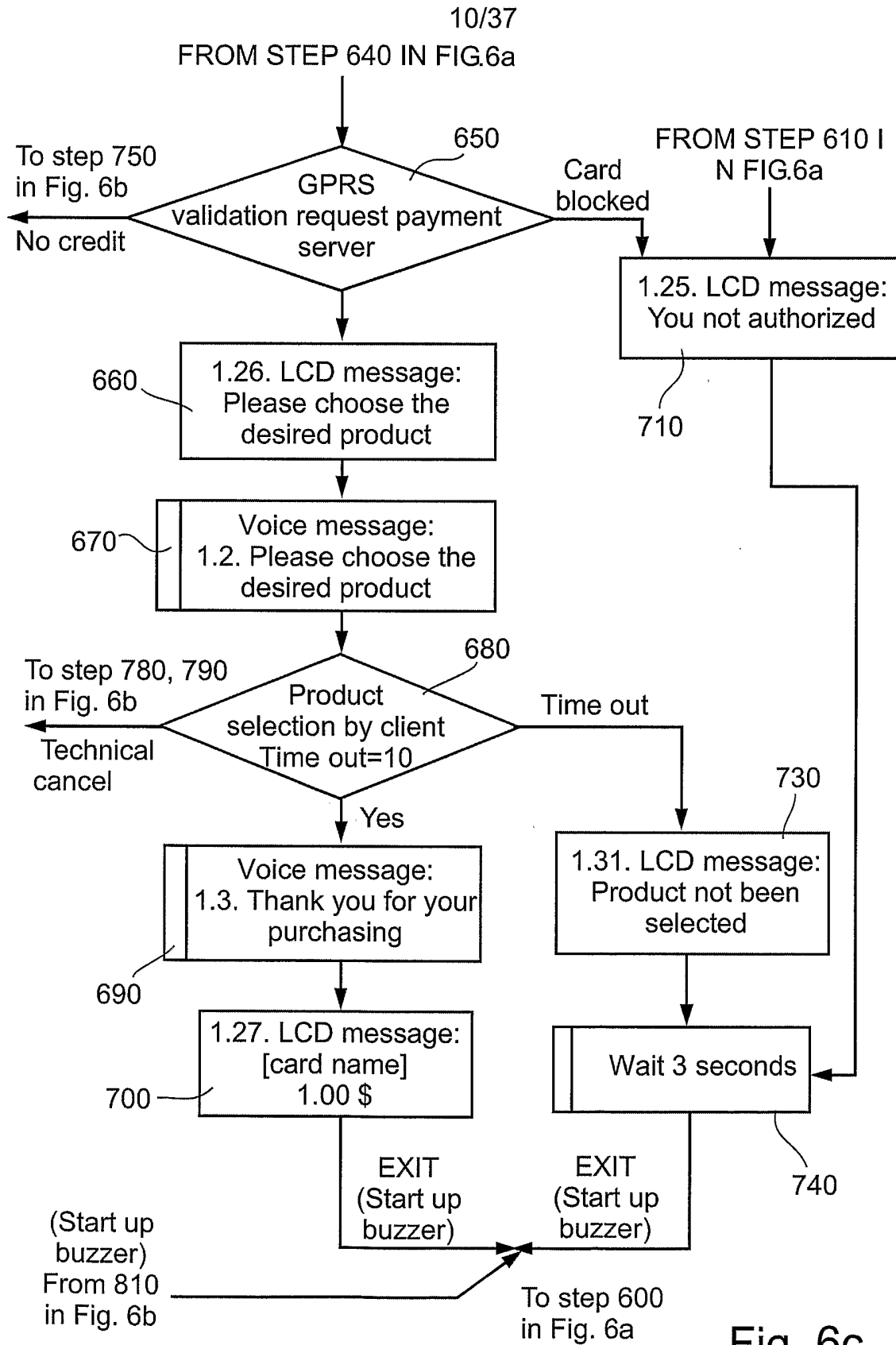


Fig. 6c

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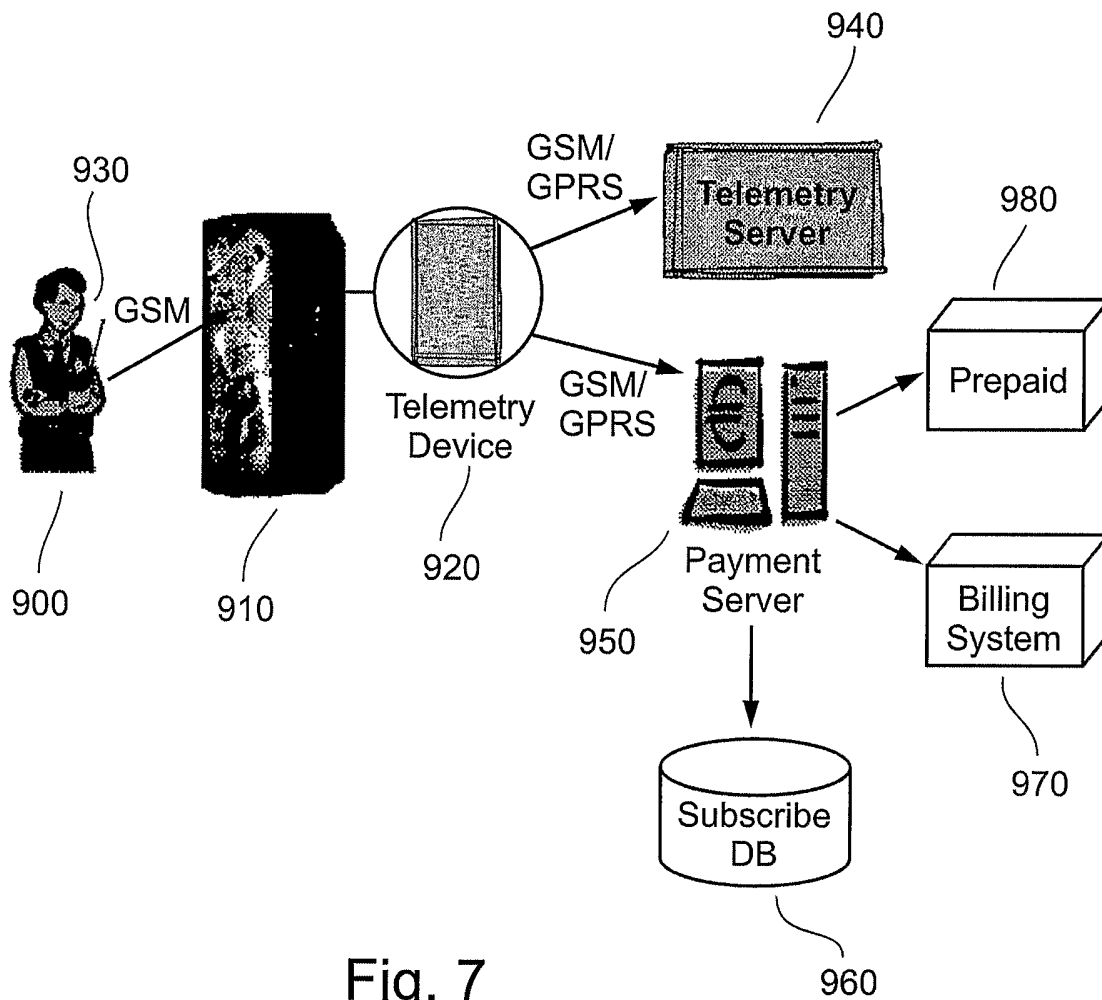


Fig. 7

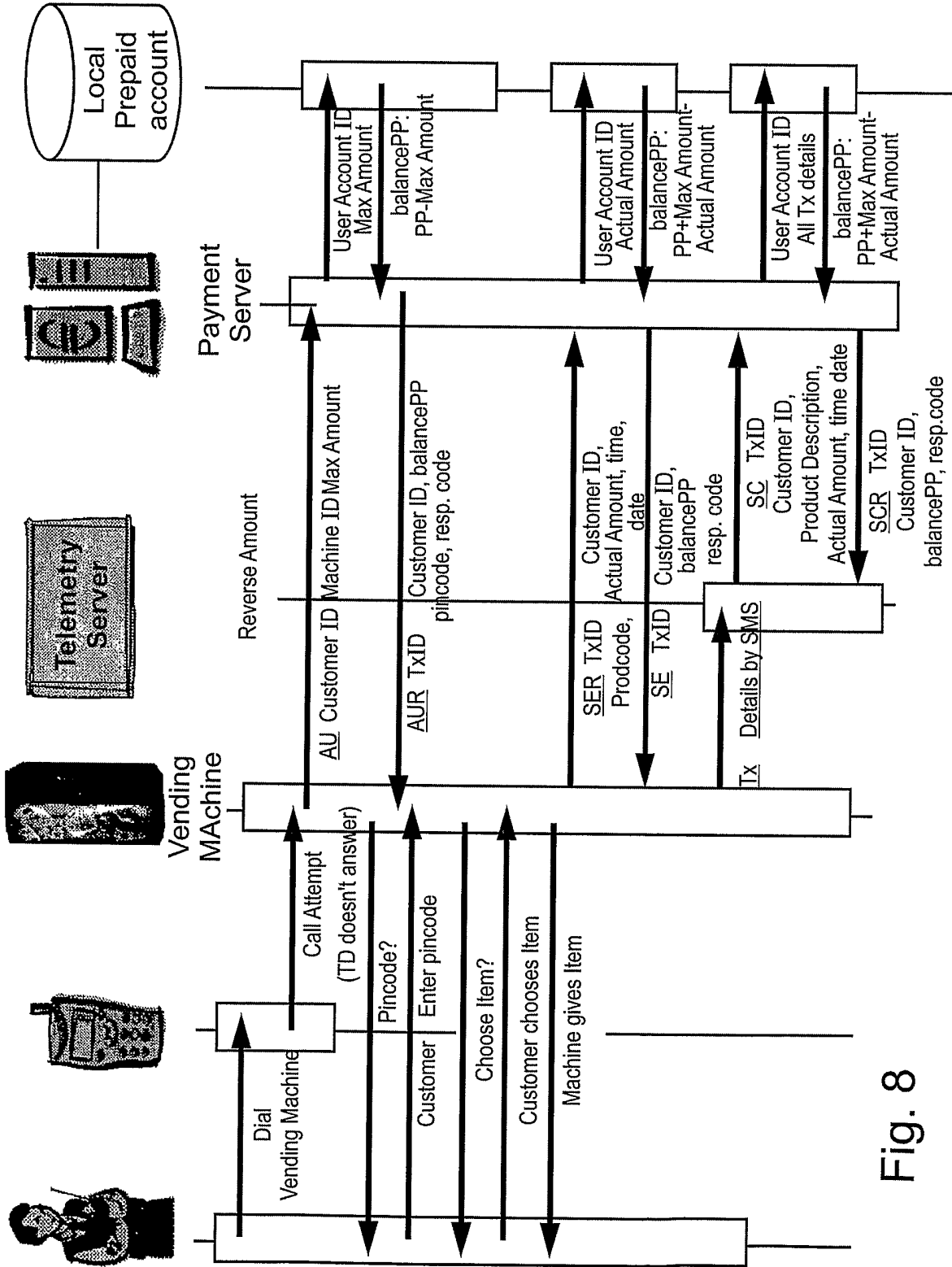


Fig. 8

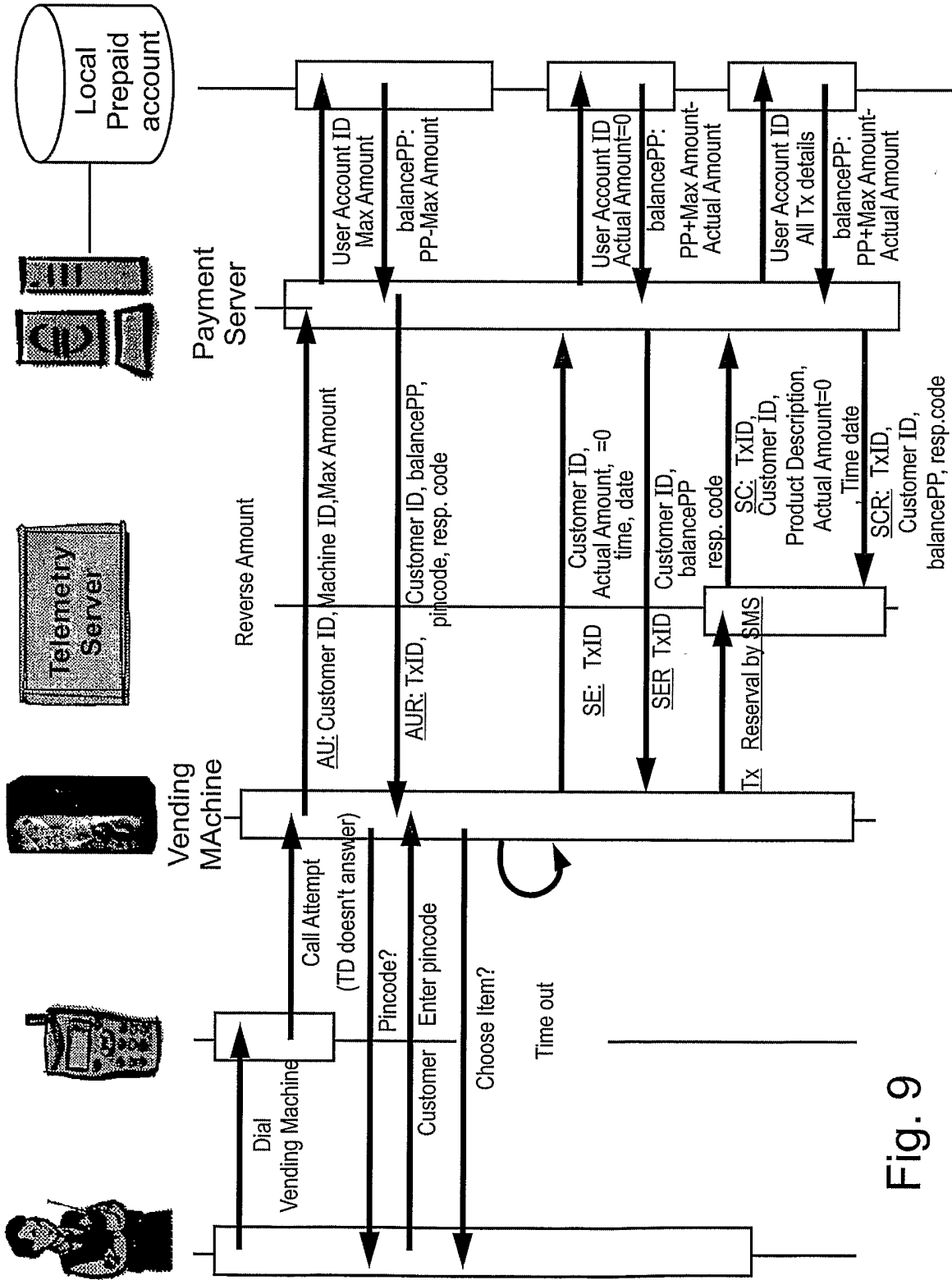


Fig. 9

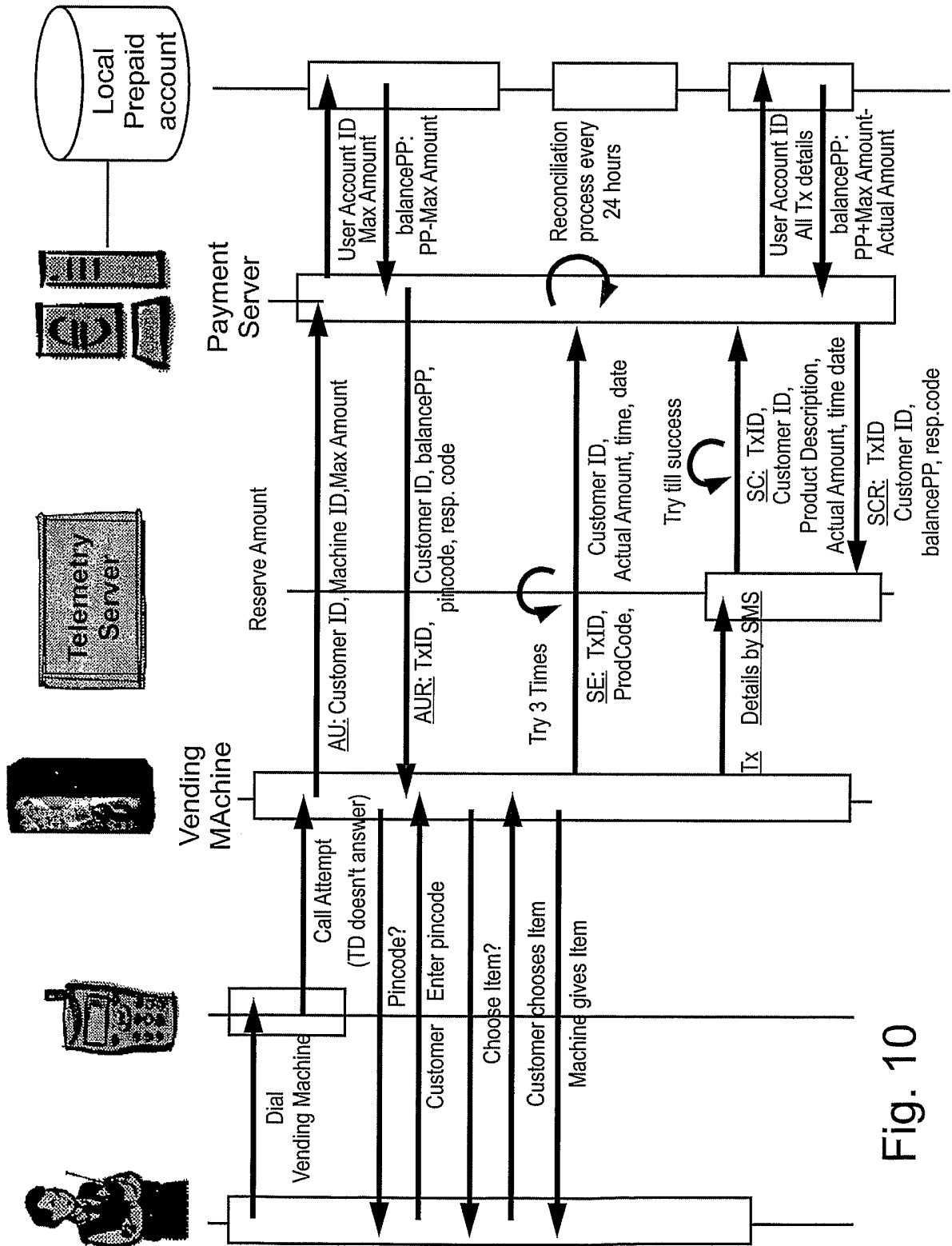


Fig. 10

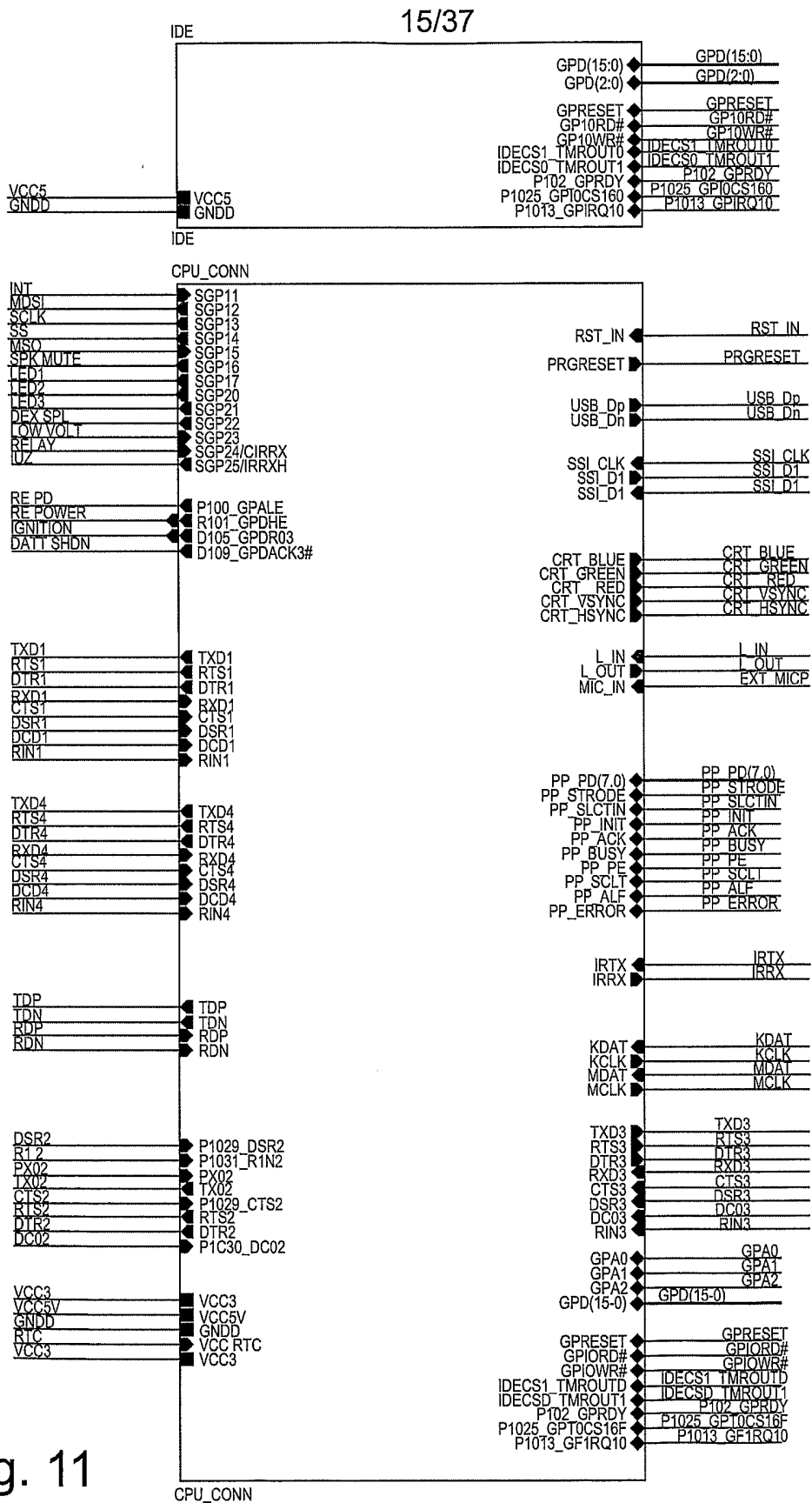


Fig. 11

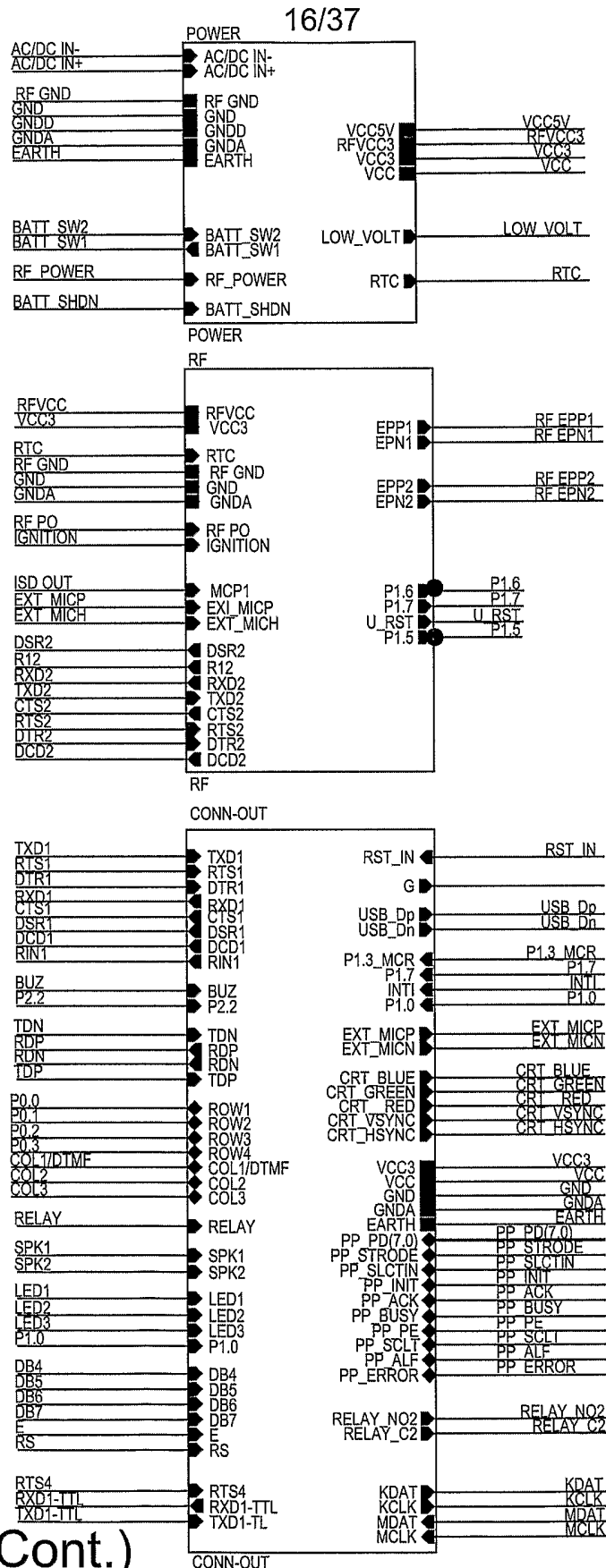


Fig. 11 (Cont.)

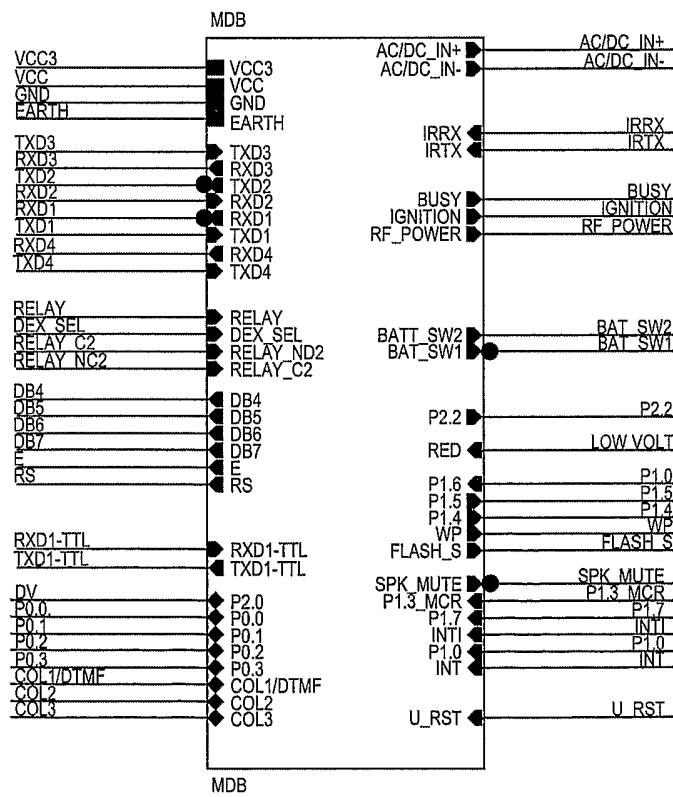
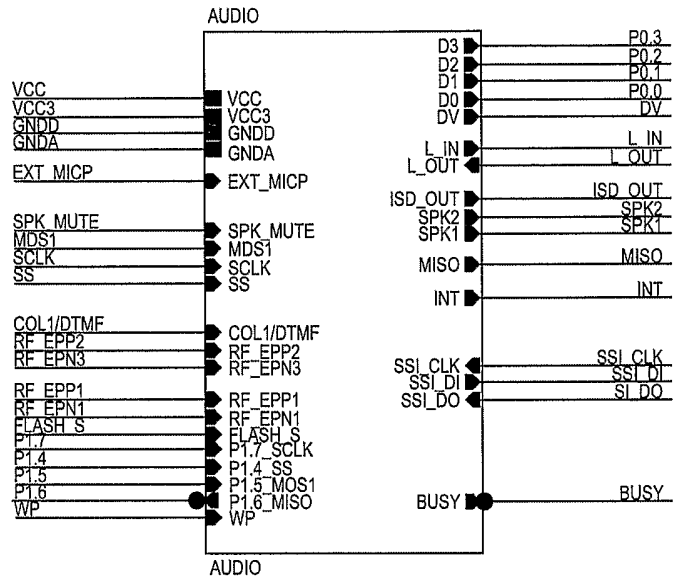


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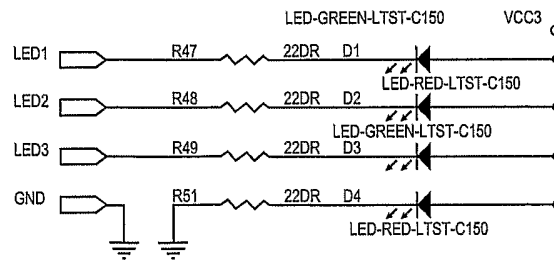
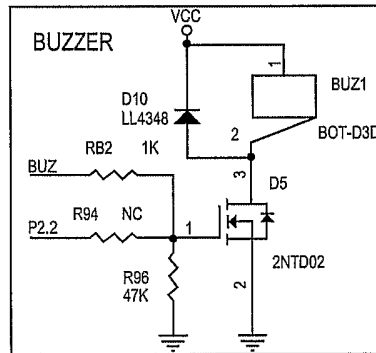
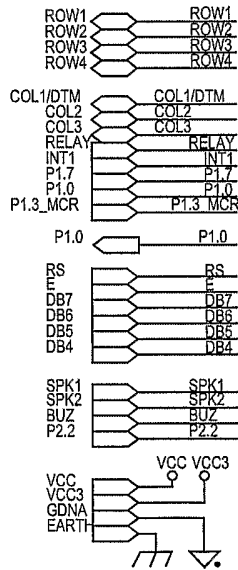
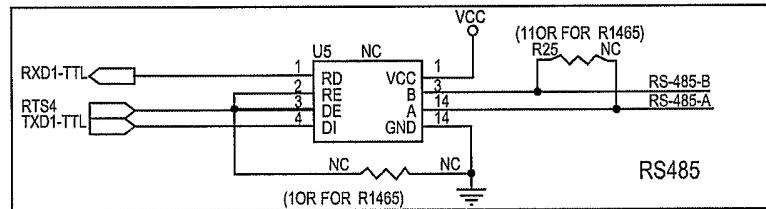
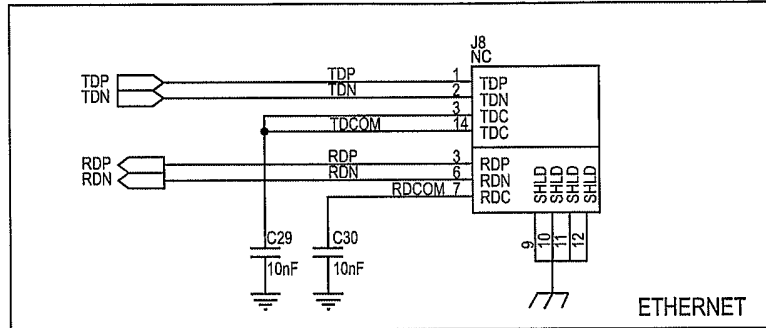


Fig. 12

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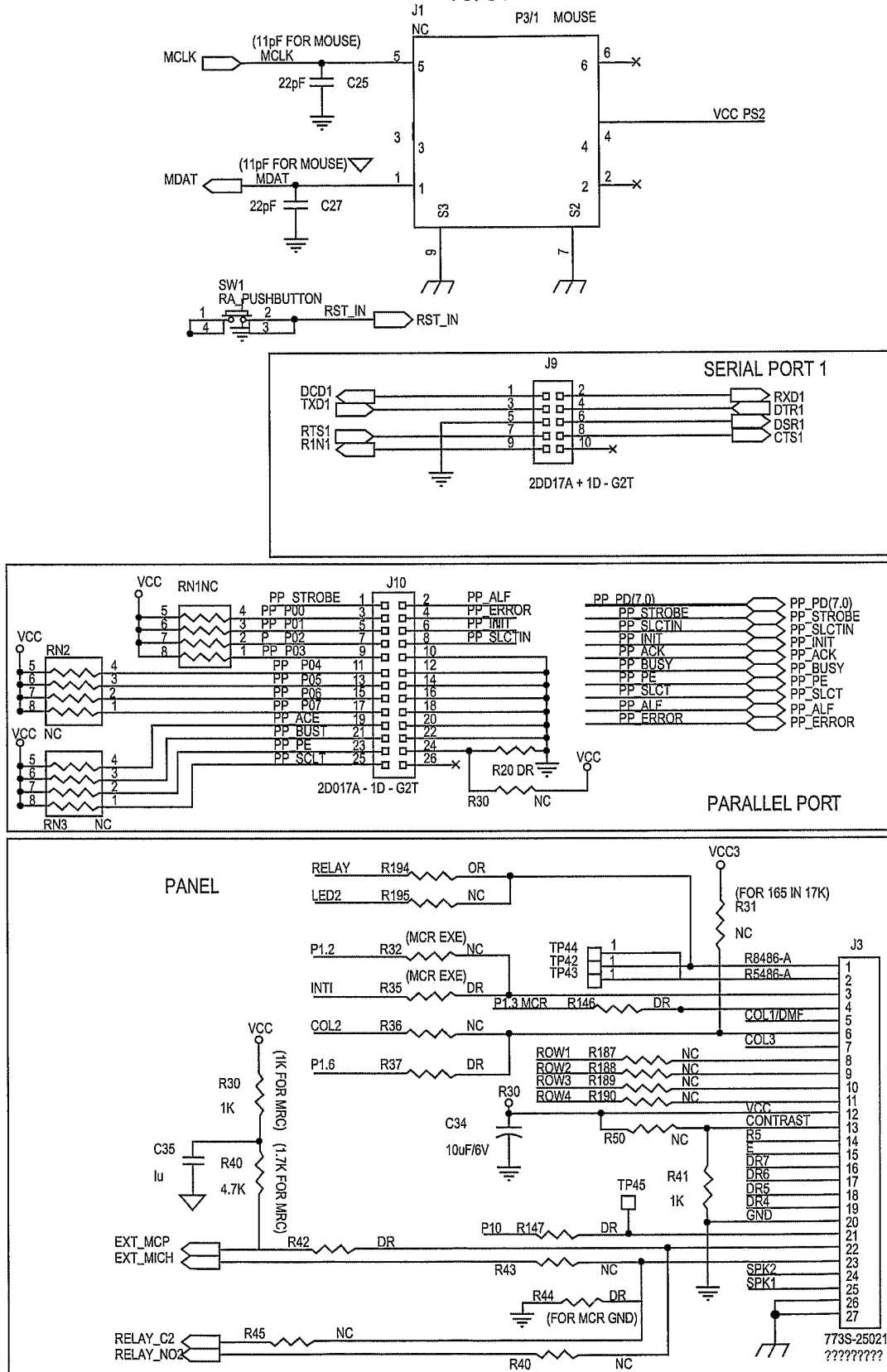


Fig. 12 (Cont.)

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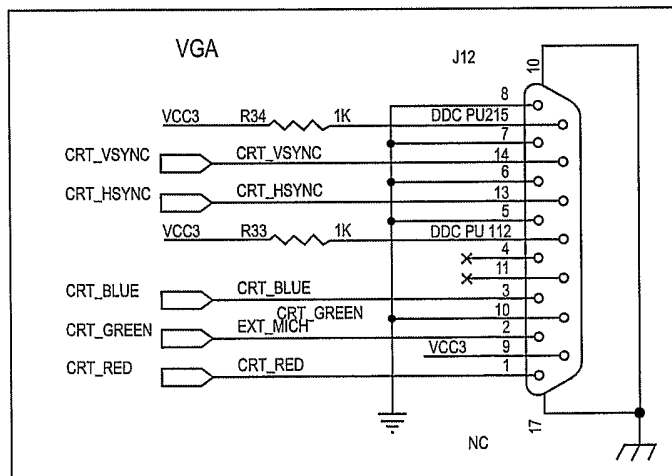
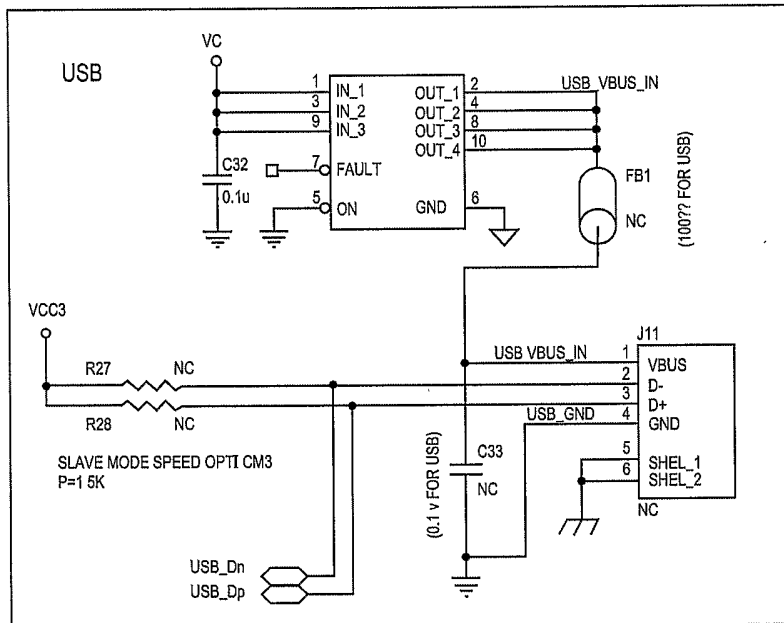
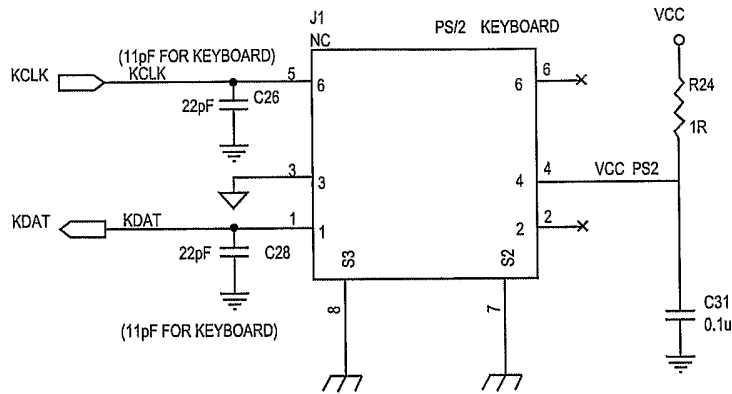


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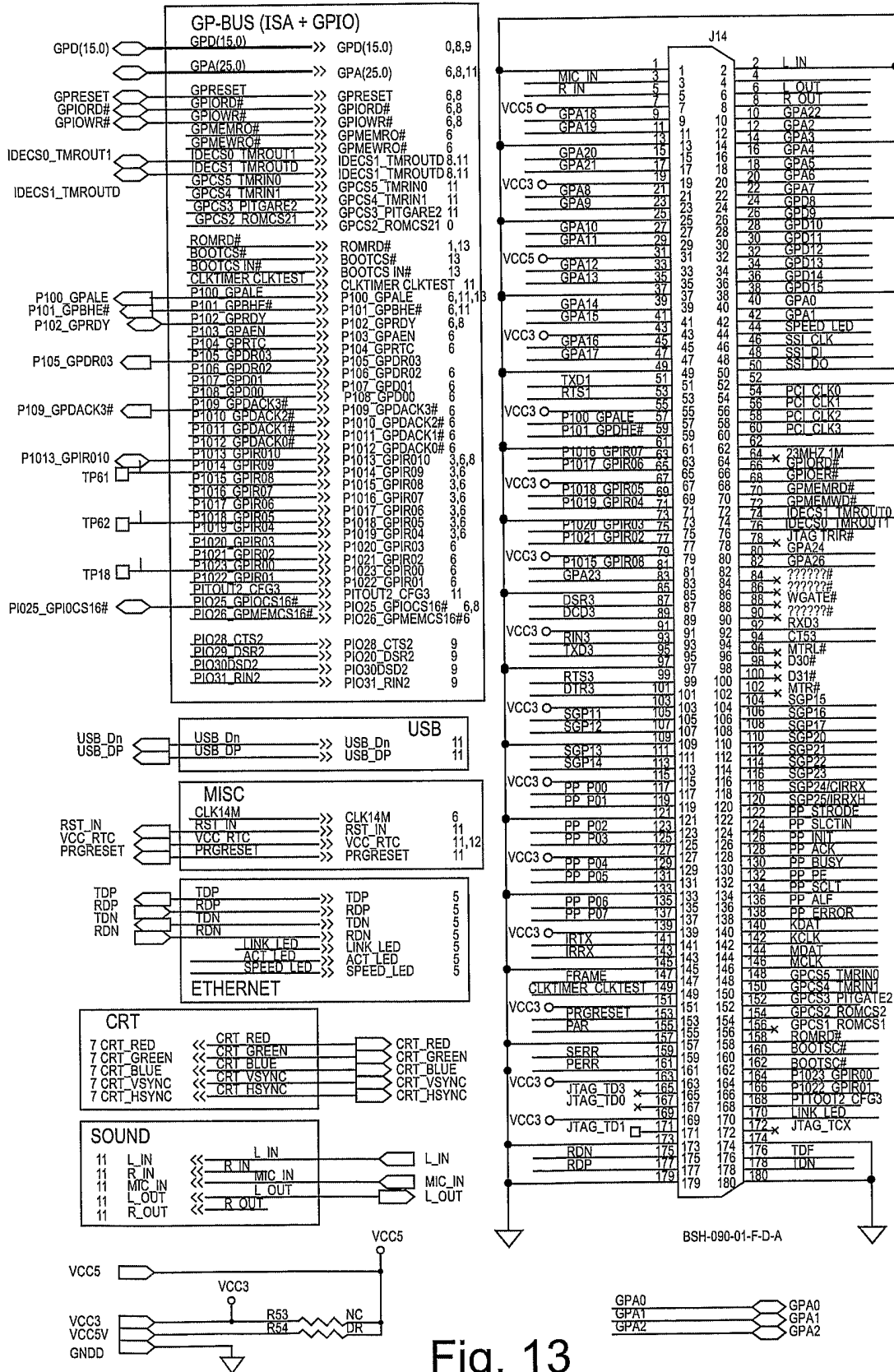


Fig. 13

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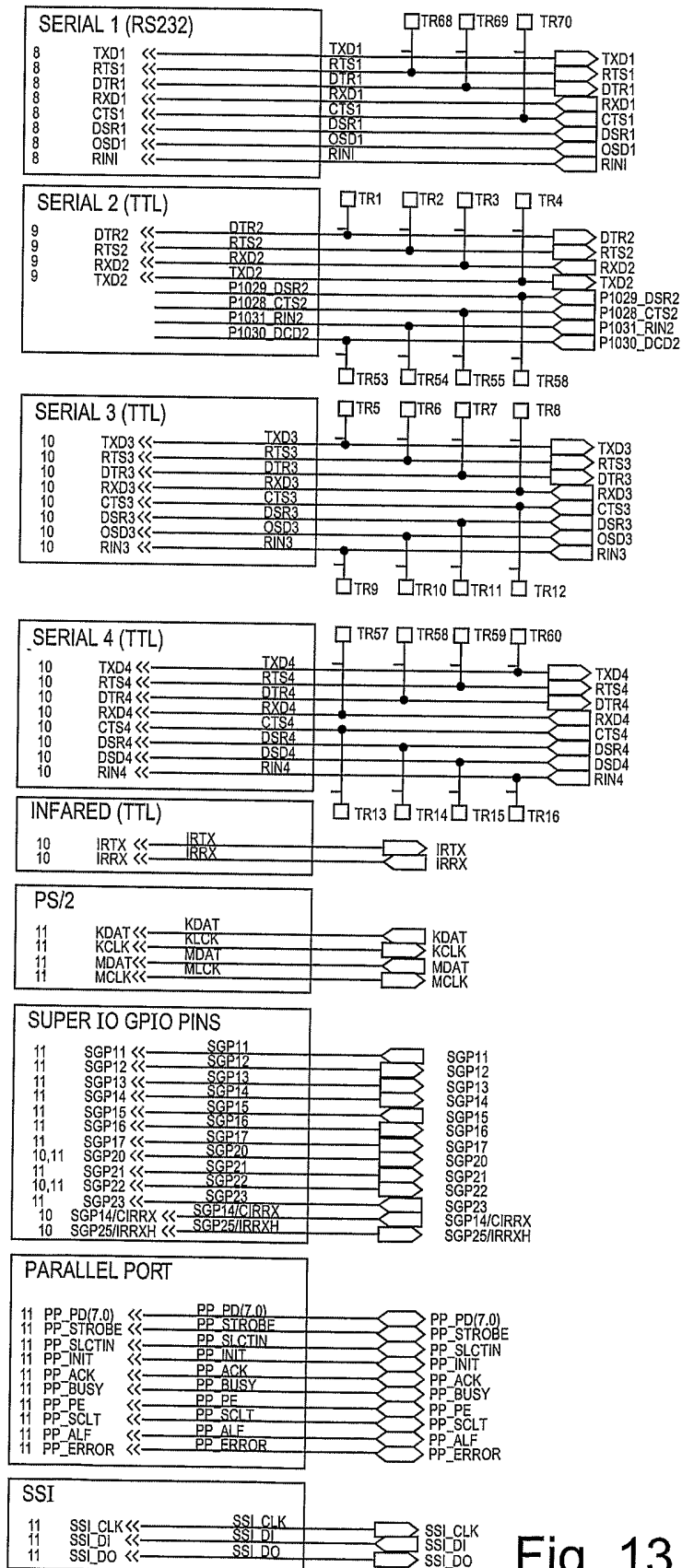


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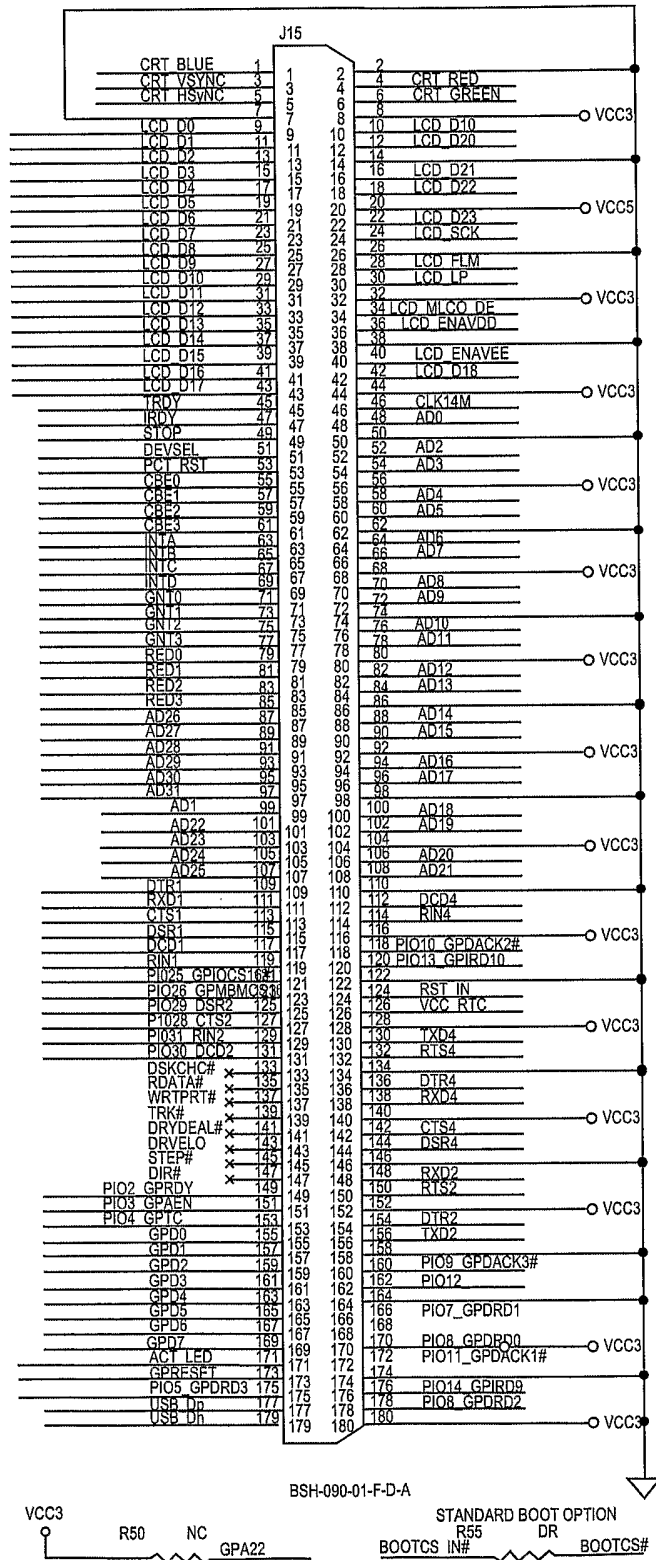


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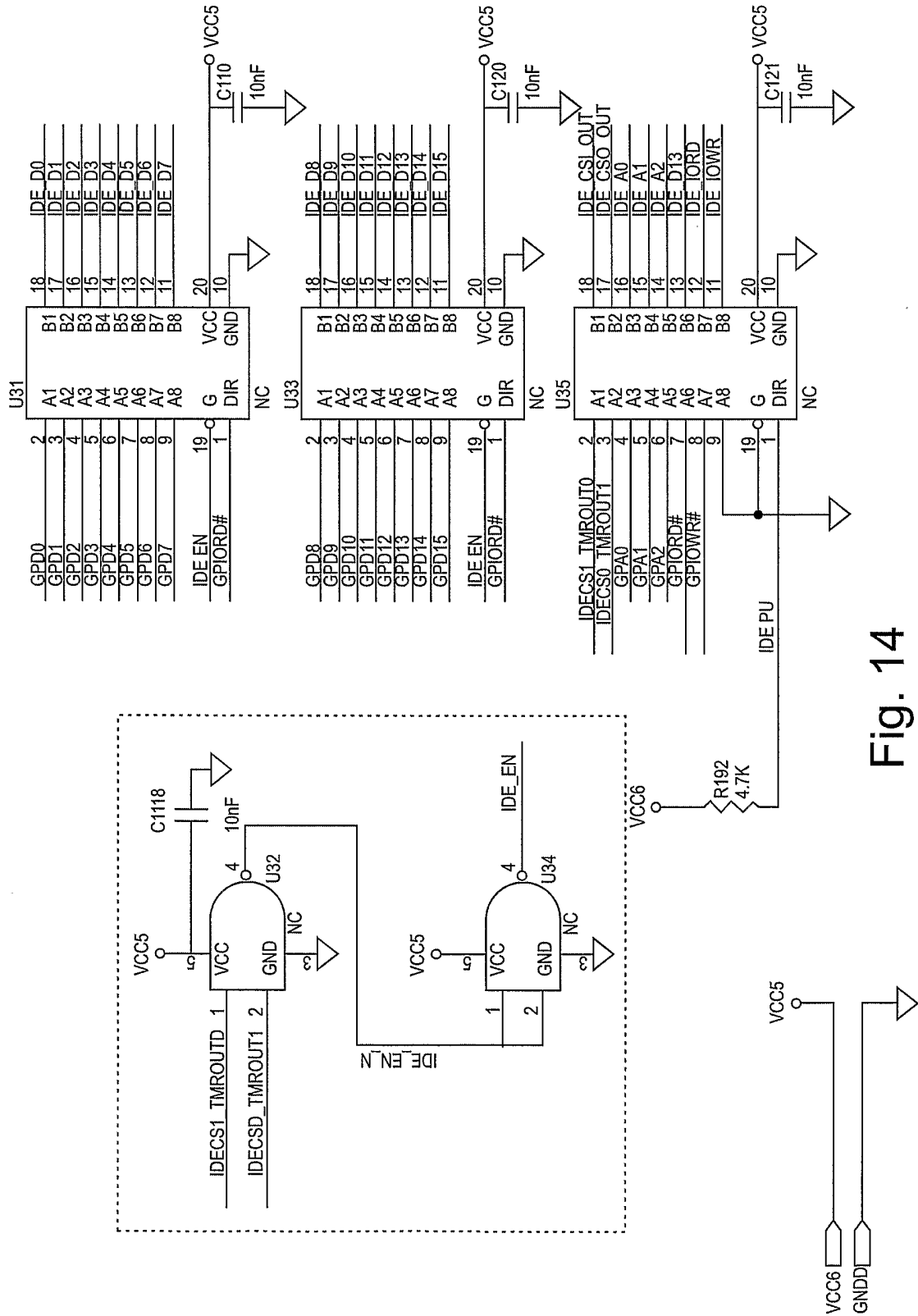


Fig. 14

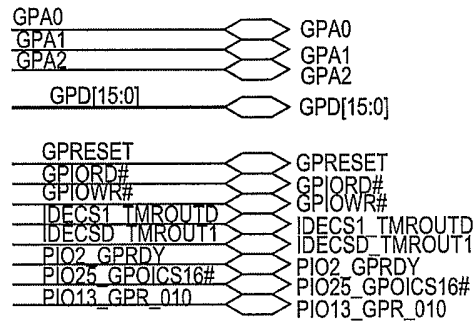


Fig. 14(Cont.)

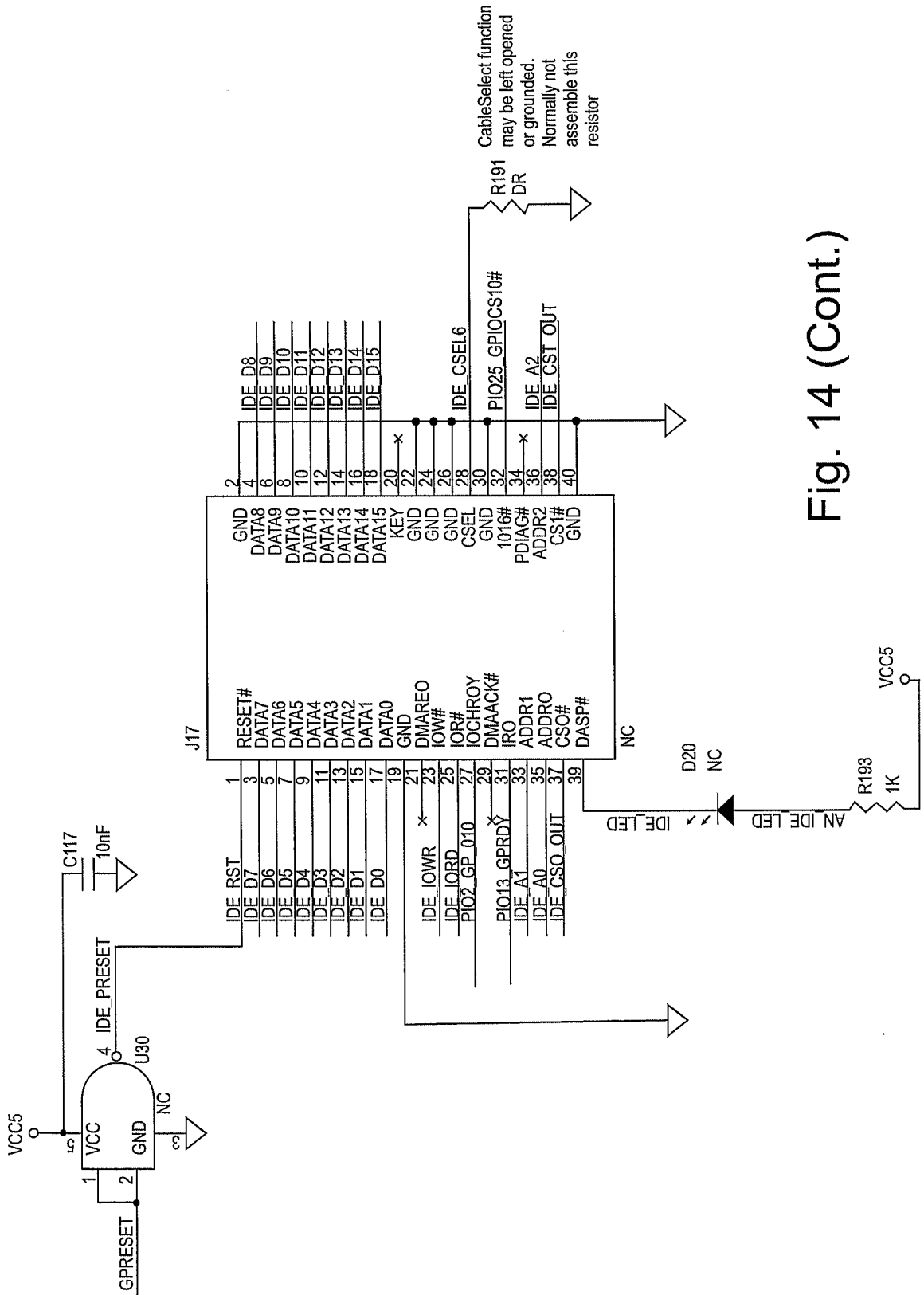


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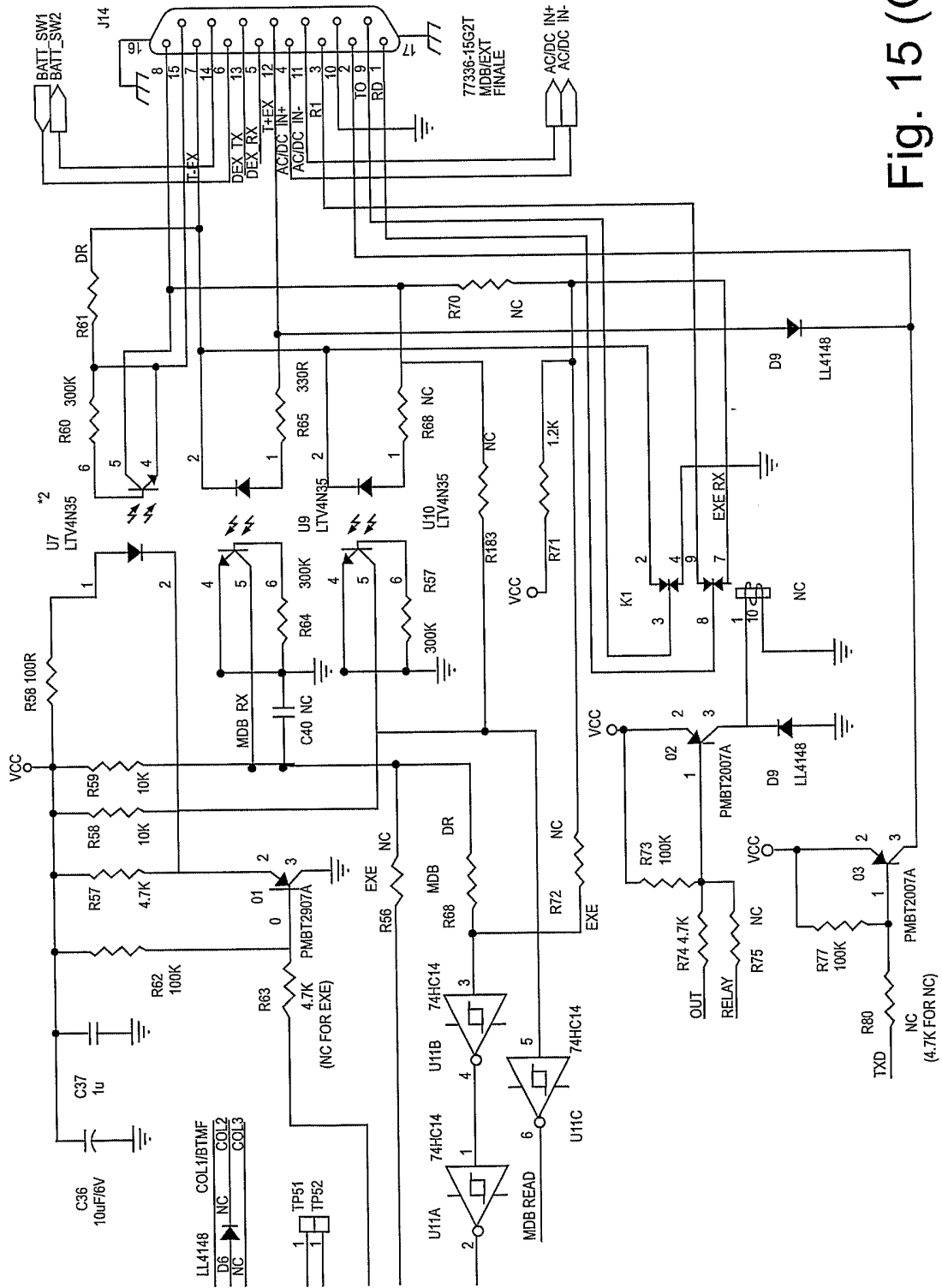


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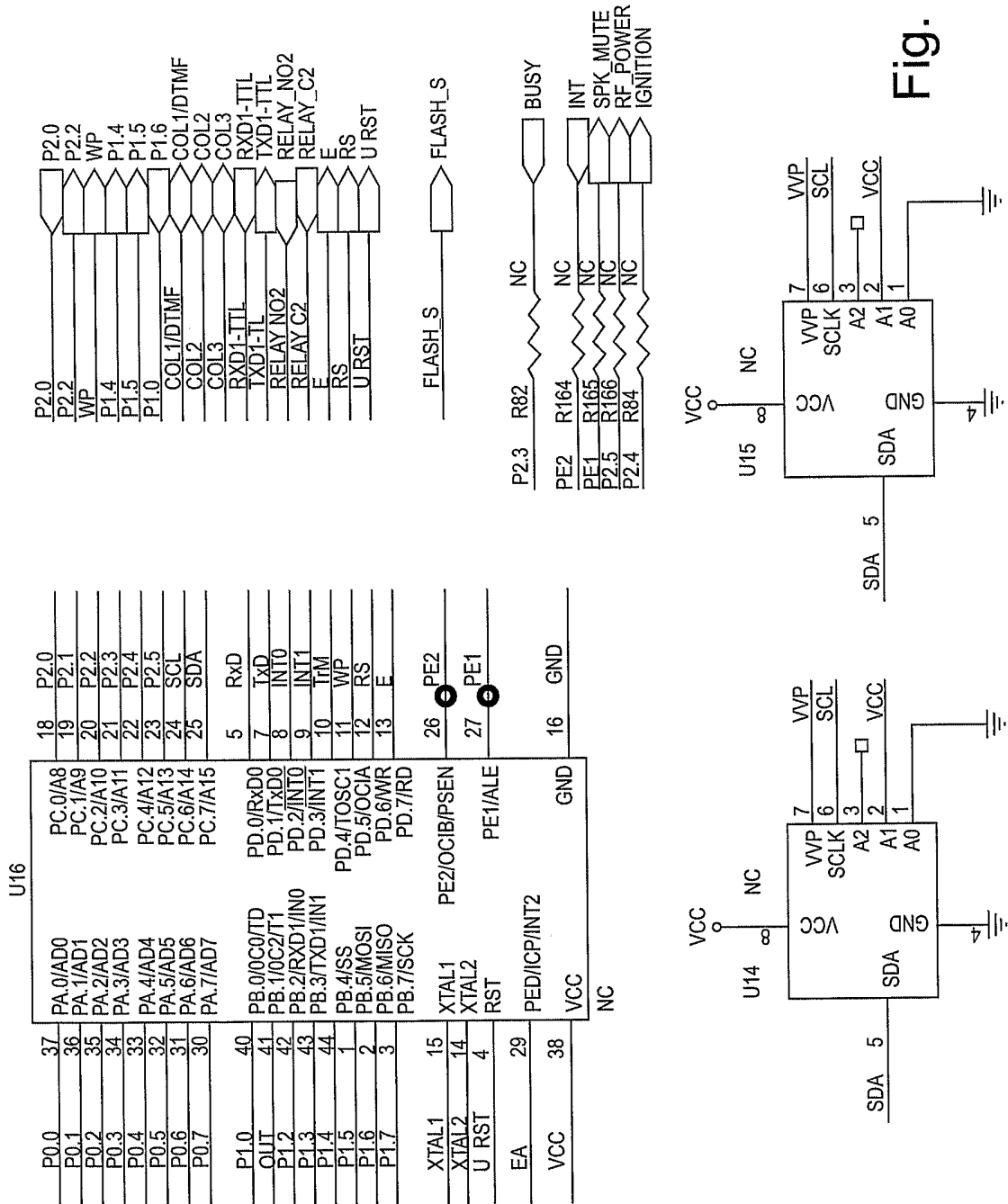


Fig. 15 (Cont.)

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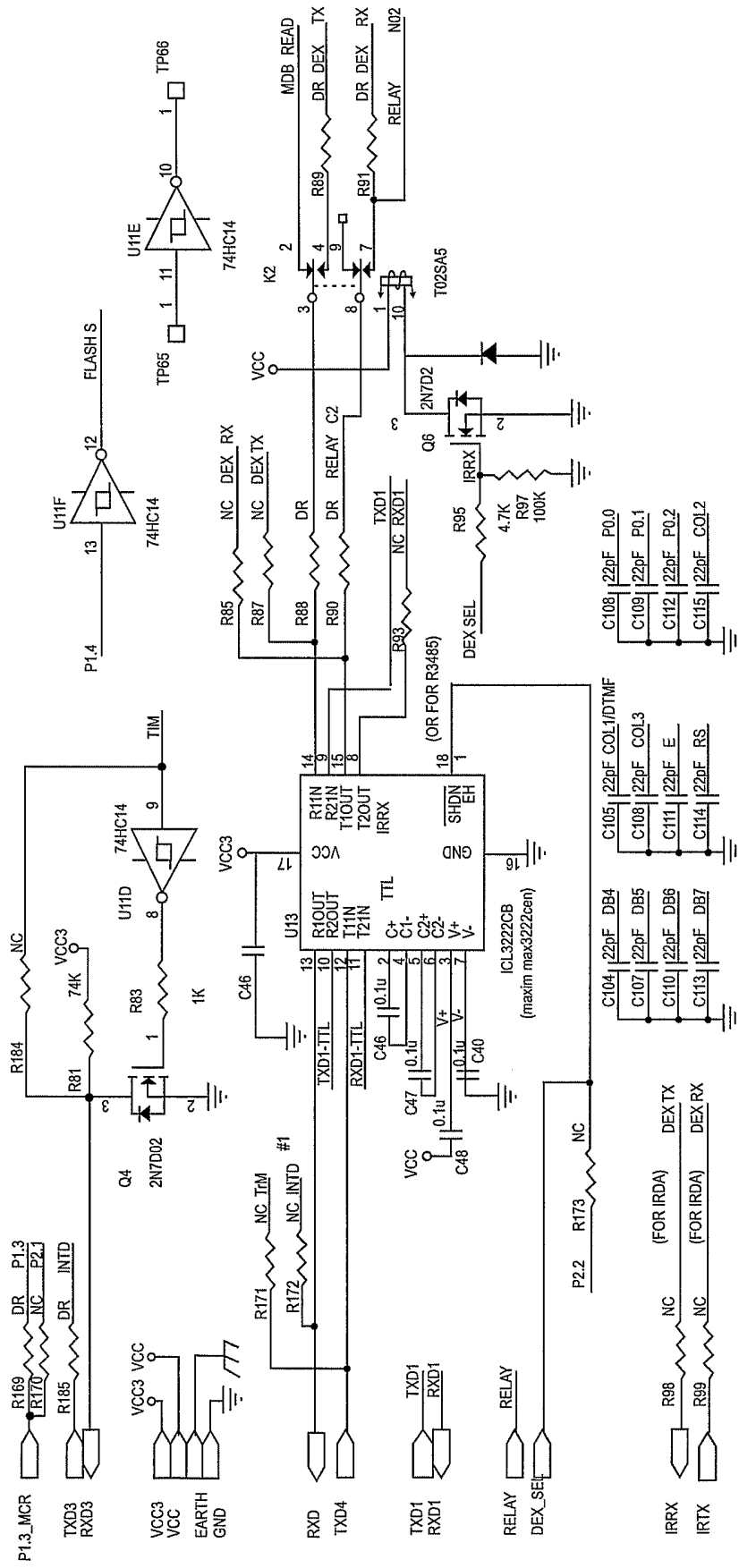


Fig. 15 (Cont.)

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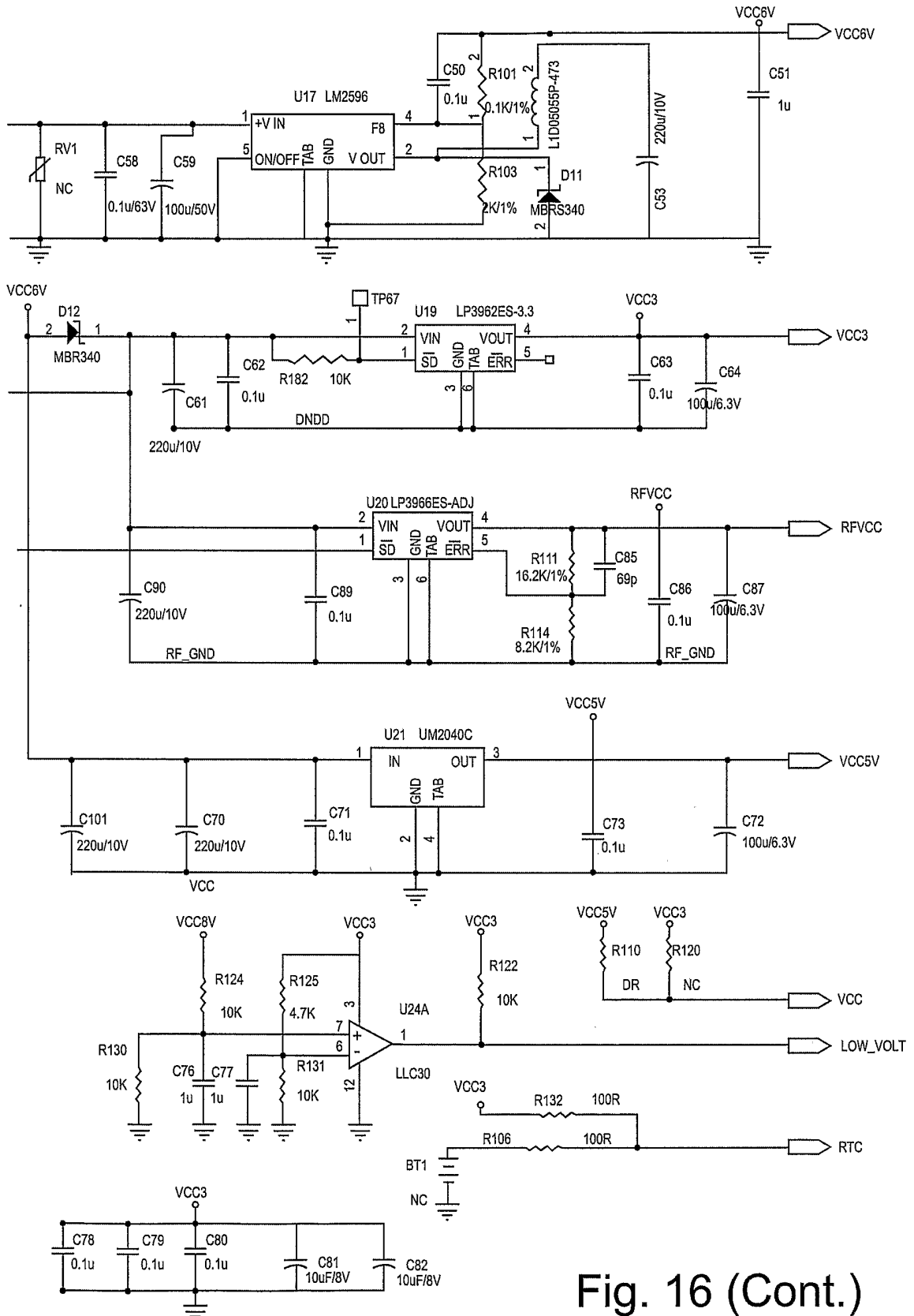


Fig. 16 (Cont.)

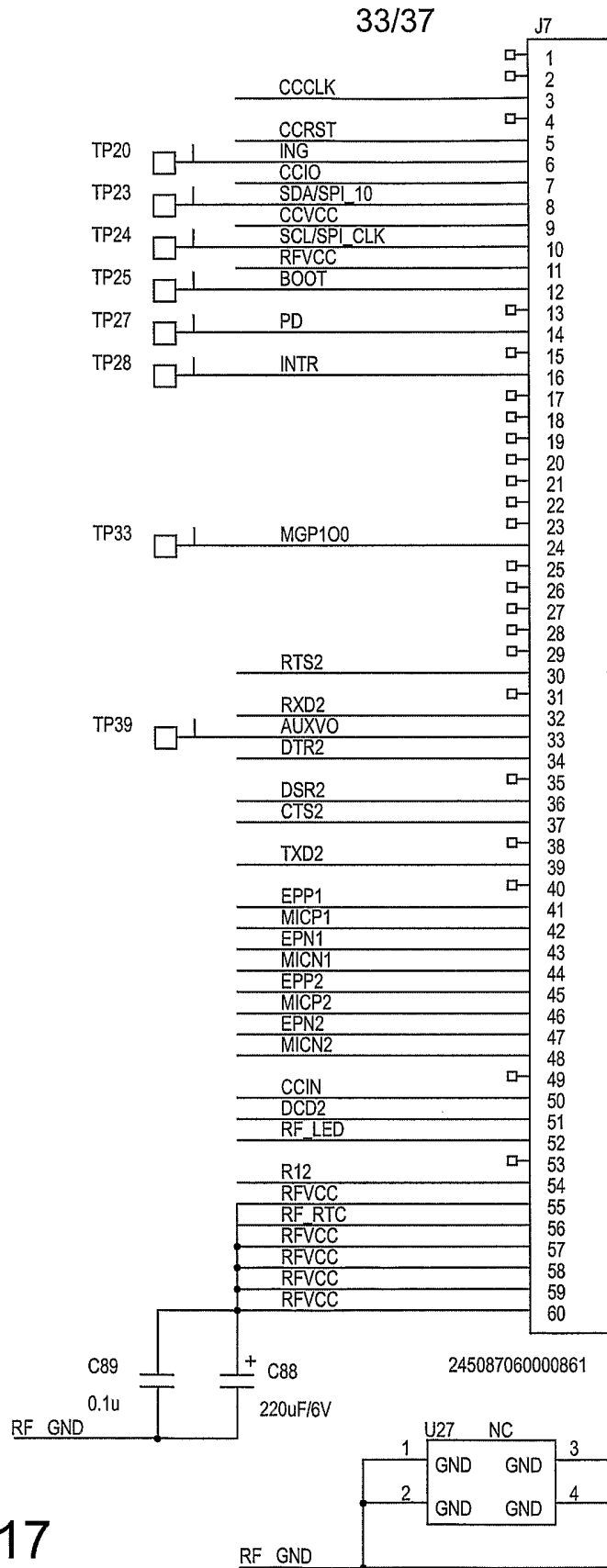


Fig. 17

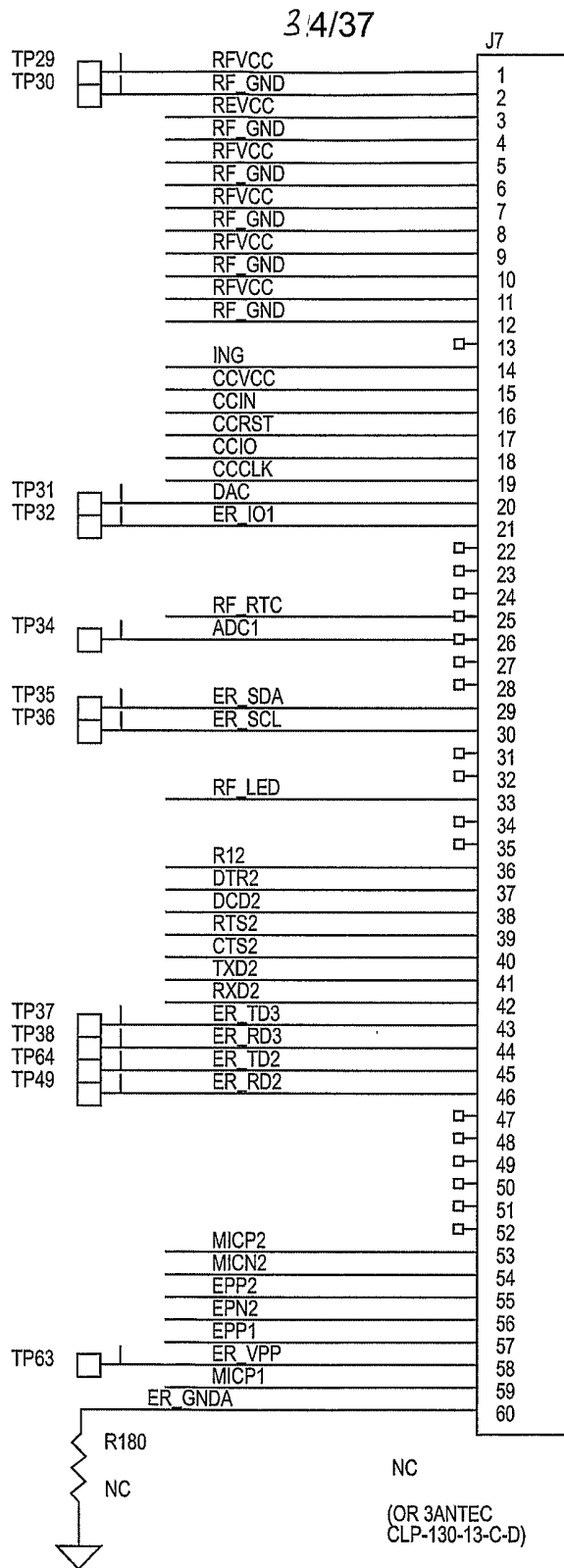
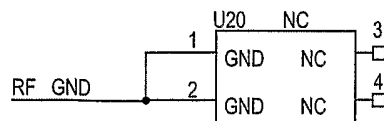


Fig. 17 (Cont.)



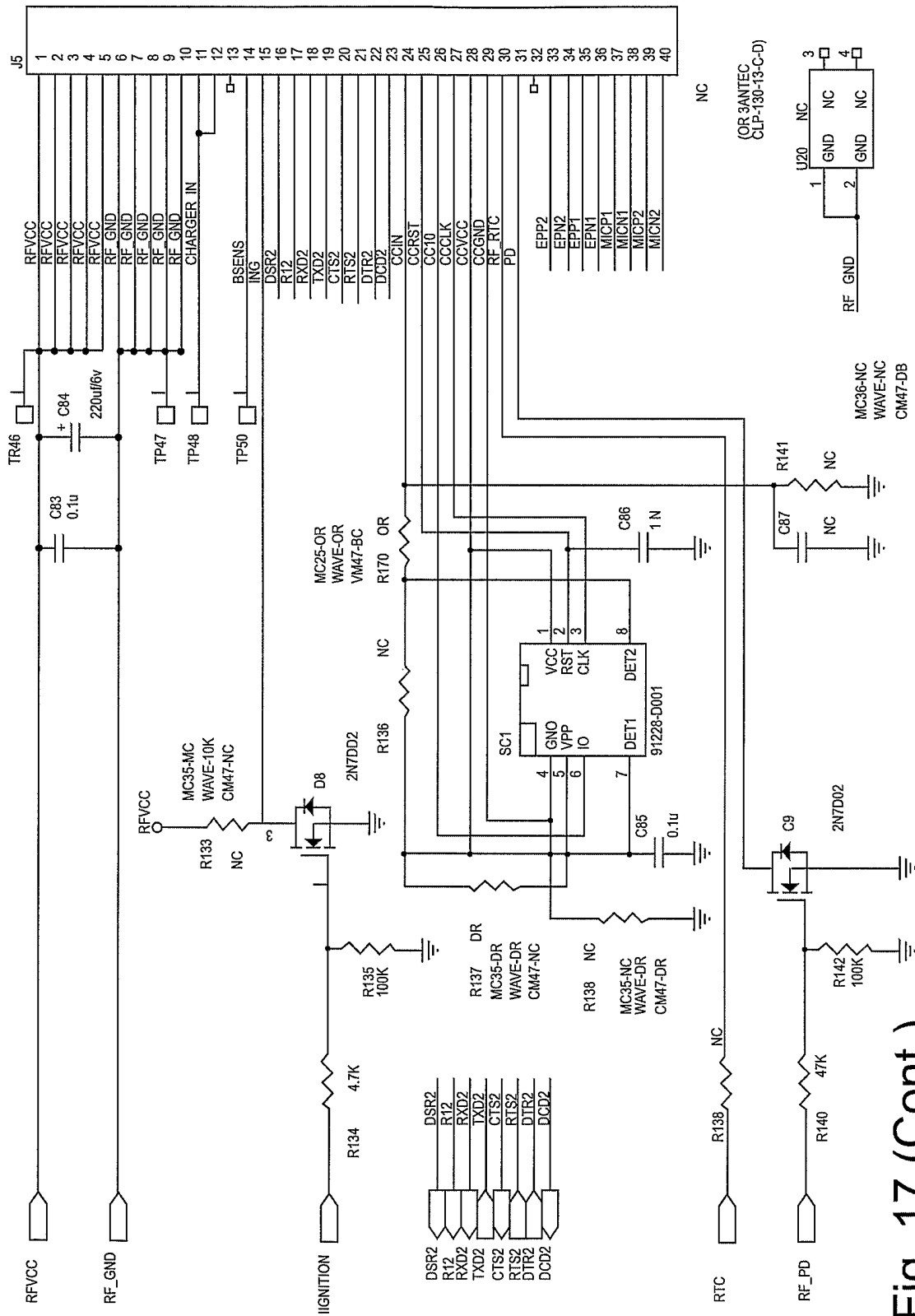


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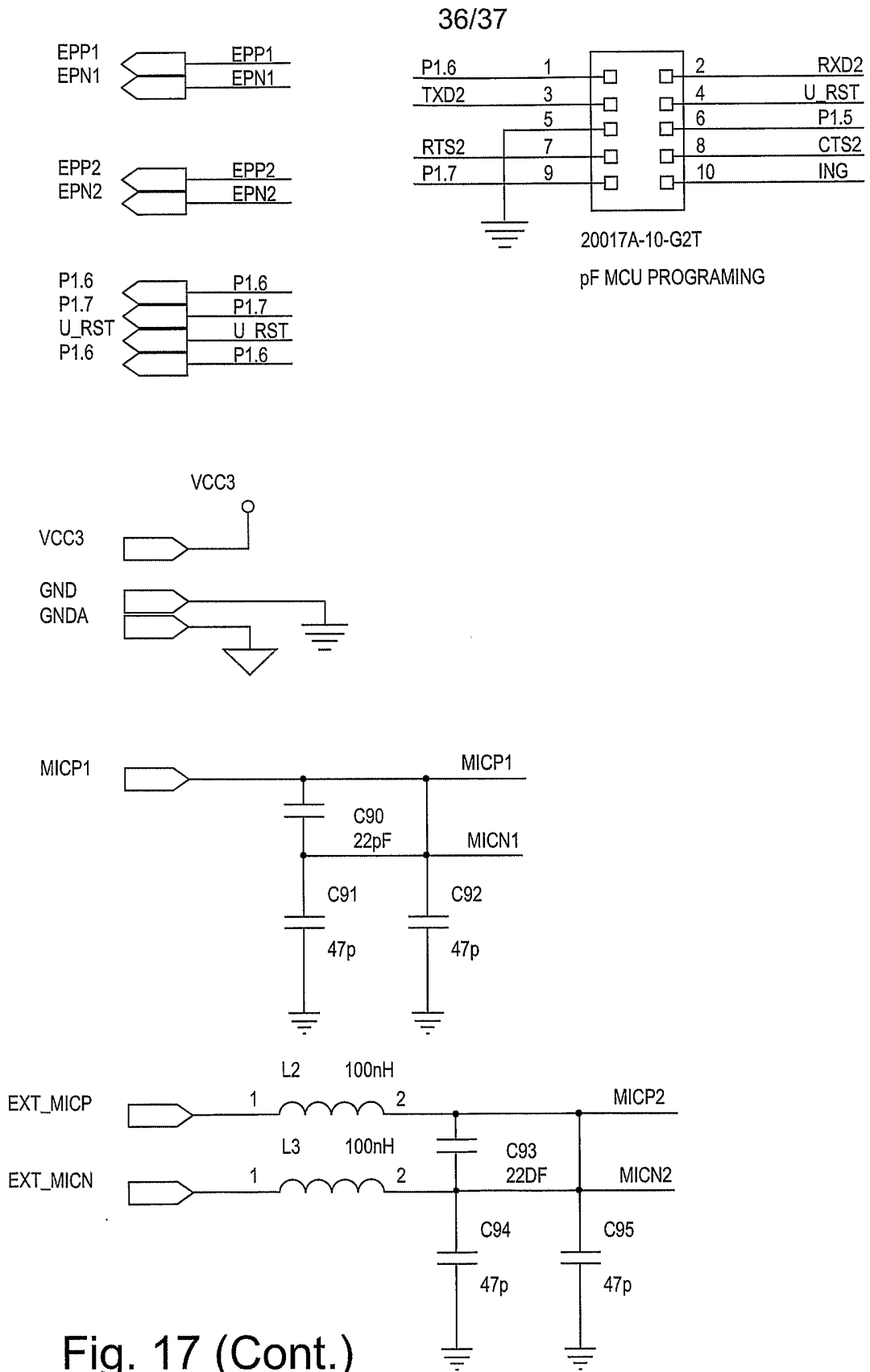


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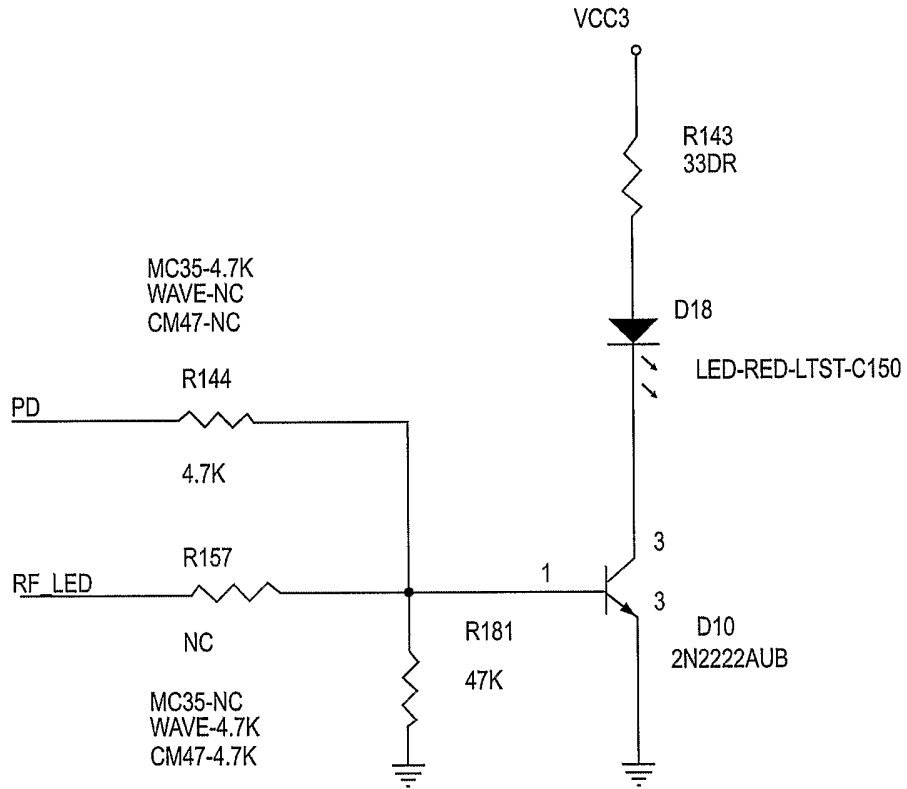


Fig. 17 (Cont.)