RTTY

XE1H WOBP WO1TQ Senator at Mexican LMRE Convention In Reynosa

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NEWS OF AMATEUR RTTY

NOVEMBER, 1959
25 Cents
Vol. 7, No. 11

HORSE TRADES

This page of the Bulletin is for use of amateurs who have RTTY EQUIPMENT FOR SALE OR TRADE and those looking for equipment to buy or trade. It is a free service and may be the means of getting someone on the air.

FOR SALE: Tape splicers @ 5.00 Sync motors @ 15.00 .... WØLFI

FOR SALE: Model 26 complete with table, will trade for tape gear .... KØBWU

FOR SALE: Polar relays 3.00 Toroids (1.6 Hy C. T.) 50c (Postpaid) W6DIE

FOR SALE: AN/FRR-3-A complete with AFC panel for FGC-1 150.00 .... W6AEE

FOR SALE: Limiter Amplifier and Detector panels from AN/FGC-1 20.00 .... W9GRW

FOR SALE: Teletype repairs, parts and service.......... W2ZKV

W6EV

W9GRW

FOR SALE: Non typing reperforator 100.00 Model 14 kybd perforator with end of line indicator 50.00 .... W6VPC

FOR SALE: Model 26 complete with table W6EHZ

FOR SALE: Model 14 Transmitter Distributor 150.00 Art Addaway, 9709 Ben Hur, Whittier, Calif.

RTTY, Inc.
372 WEST WARREN WAY
Arcadia, California
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Mexican LMRE Convention at Reynosa

I have been planning for over a month to write you and send pictures which may be the last of our mutual friend, WØBP, which I took at the Mexican LMRE Convention in Reynosa, but I have been down with my back.

I started on my vacation approximately two weeks before the convention, and made plans to meet WØBP at Reynosa for the convention, and I want to say that we were treated royally by the Mexican amateurs and BEEPS talk on RTTY was very well received by the boys. The language barrier was handled by an interpreter and also many of the Mexican amateurs speak or understand English.

The picture showing Beep at the blackboard is at the start of his talk and the young man facing him in the dark coat was the interpreter, a local broadcast announcer. The second picture showing the four together is: (Left to right) General Alberto Mercado XE1H of Mexico City who was President of the convention—No. 2 of course is WØBP—No. 3 was Adolph, WØITQ, who was also fatally injured in the accident with WØBP — No. 4 is the Senator from Tamaulipas, and I hope he will forgive me for forgetting his name as I had expected WØBP to be sending you these photos on his return from Mexico and the ARRL Convention at Galveston. The following Tuesday he was to have been in Independence where I had arranged a dinner and meeting with our local group, but as you know due to the tragic accident he was unable to be there.

The most peculiar situation I found in the difference between an American convention and Mexican convention was that you have a meeting and then you eat and I must say that the hospitality shown us by this group was most gratifying and I am sure that WØBP was well pleased and I know that he would have expressed the same opinions were he able.

After I returned home I had one QSO with him on 15 meters as XEØBP. Band conditions then became so bad that for the next two weeks we were unable to do anything.

Ralph Hazel, WØITX
10605 E. 27th St. Terr.
Independence, Missouri

WØBP/XEØBP - TALKS

Closed Circuit TV set-up to enable audience to see close-up of equipment when Beep explained details.

The favorite pastime at a Mexican convention

British Amateur Radio Teletype Group

NEWS SHEET NO. 2

August, 1959

Much has happened since our first News Sheet appeared. The most important item of news is that we have been able to obtain 21 teleprinters! These are ex-G.P.O. tape printers, all in working order, of the type known as Creed 3A. The price — £3:10:0d. ex G2UK! Yes, three pounds and ten shillings each! This is the best piece of luck the Group could possibly have had. As well as these 21, we have also obtained 7, described as "scrap," for spares. Full details regarding them will be circulated in a later News Sheet, but briefly they are 20 inches long, 14 inches back to front and 10 inches high. Weight 60 lbs. The motors run on 110 volts D.C. at approximately 0.7 amperes. For those who are unable to organize such a supply for themselves, we are negotiating for some suitable rectifier units; at we hope, as advantageous a price. We will let you have news of this as soon as we know something definite. Those members of the Group who require one should let the Hon. Sec. know straight away, as it is likely that they may all be snapped up quickly and we do not know when we shall have another lucky break like this.

The Group has been asked whether it could run a stand at the forthcoming R.S.-G.B. Radio Hobbies Exhibition in London, November 25-28th. Now this is a great honour for such a young Group as ourselves and in spite of the obvious difficulties of such a project, your Hon. Sec. felt that it was a chance not to be missed. Whether we shall make sufficient progress to put a "live-show" on remains to be seen, but we ought to be able to make an interesting stand, demonstrating the above mentioned teleprinters and several receiver FSK converters we know are on the stocks. Volunteers for stand duty would be most welcome and any ideas for adding to the interest of the stand will be most carefully investigated.

The Group now numbers 23, 14 of whom have call signs. Even your Hon. Sec's enthusiasm did not lead him to expect quite such support within six weeks of the Group being formed. This is quite enough to get some useful activity going on the air and to make an RTTY Net possible. The various steps necessary to reach this end, would seem to be as follows: First get the 3A's running; then build up and get some experience of receiving converters and their coupling to the teleprinters. Then some thought should be given to suitable Net frequencies — possibly 80 metres to start with, as there is already plenty of commercial RTTY activity in this band and finally the construction and operation of FSK transmitters and the operation of complete two way RTTY communication. Your Hon. Sec. feels that the utmost care must be taken to keep out of the way of other users of the Amateur bands, at least in the early stages, until we have been able to prove that RTTY causes less QRM than an AM signal, less than an SSB signal and less even than a chirpy CW signal. 80 metres is not heavily occupied by Amateur signals at some times of the day and it should be possible to find a channel there where we can operate "quietly in the corner."

We have received a number of comments on the question of RTTY and QRM. Theyl range from the uninformed critic who dismisses the subject with "Well, I'm against anything which causes more QRM in the Amateur bands," to logical statements of fact. Of these, that from John B. Tuke, G3BST, sums up the views of those in sympathy with our aims. John writes: "I agree that the individuals who decry RTTY simply show their ignorance. The bandwidth required hardly exceeds that required for telegraphy and is certainly far less than A3, whether DSB or SSBSC. It will work under QRM conditions that will swamp A3 or A1 and results in much shorter time being needed to pass a given amount of traffic." We were interested to read in the May issue of the Shortwave Magazine, under the heading "Some Notes on FSK" that a 10KW CW transmitter was required to give the same reliability of service as a 2.5KW FSK one. FSK will give the same service with far less transmitter power than is required for even CW service. How much better it is then than phone transmissions.

Jim Hepburn, VE7KX writes: "Thanks for sending me a copy of your News Sheet. It was very interesting reading and a very commendable effort OM. I cut your News Sheet onto tape and sent it complete on my RTTY Bulletin last Tuesday night and heard W6VPC repeat it on his NCARTS broadcast last Wednesday and tonight W2-JAV told me he had copied it from the East Coast RTTY Net over the weekend. So it got around!!!

We have had some B.A.R.T.G. headed paper done, first to help put ourselves on the map. Members requiring same can have 50 sheets for 5/-, postage and packing paid. Sample enclosed herewith.

It is regretted that all the copies of the "RTTY Handbook" are out. Would those who have them please try and return their copy as soon as possible, as others are waiting to borrow them.

That seems to be all the news for this time, so:

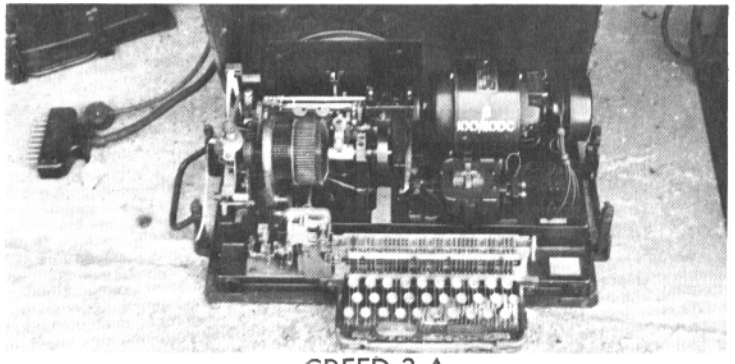
THINGS TO DO:

1. If you want a teleprinter write the Hon. Sec. *NOW*.
2. If you can help at the Exhibition or have any bright ideas for the stand, write the Hon. Sec.
3. Please return the "RTTY Handbooks" as soon as possible as others are waiting to read them.

73,

Arthur C. Gee, G2UK,
Hon. Secretary, B.A.R.T.G.,
"East Keal,"
Romany Road,
Oulton Broad,
Suffolk.

First batch of Teleprinters acquired
G3JMU G2CPL G3IAO



CREED 3-A

A MODERN AMATEUR COMMUNICATIONS SYSTEM

DAVID E. CHAPMAN
W9DPY

Director Midwestern Engr. Div.
TELECHROME MFG. CORP.

I would like to present a versatile arrangement for the operation of a complex amateur station. The installation described in this article is very flexible and is used for teletype, single sideband AM phone, CW and some FM work. In order to present a useable picture, the over-all station control system plus a number of related items have been broken down:

1. Transmitters.
2. Receivers.
3. Controls.
4. Patching systems.
5. Teletype operation.
6. Additional uses.

TRANSMITTERS

At the present time five separate transmitters are in use. The oldest one, built in 1934, will operate with crystal or VFO control, is self contained and runs a clean kw to a pair of 250-TL's in the final. The second one is a Collins 32V2. The third transmitter is an HT-32 buit by Hallicrafters. This transmitter has a 9 megacycle external exciter for teletype use that may be plugged into the standard sideband generator socket. It will furnish a frequency shift keyed teletype signal. A polar relay in the 30 ma loop keys the FSK unit. The fourth transmitter is a 522-2 meter AM transmitter. The last transmitter (now in standby service) is an FM 2 meter unit. These transmitters are arranged in a very flexible system. They are thoroughly fused and can be cross patched to allow for defective equipment. For instance, the older transmitter has a self contained exciter. This exciter plugs into the final stage with RG/6-U and a standard automobile radio antenna fitting. The actual frequency control for this unit comes from the homemade VFO described in August and September, 1956 RTTY magazines. It is one of the most stable VFO's I have ever used and has given very good service. The VFO plugs into what was originally the crystal socket of the transmitter exciter section, then the output of the exciter section plugs into the final. The final tank (a B & W HDVL) feeds a 6 section low pass filter having 4-M derived and 2 constant K sections. The output of the filter goes to either a Johnson TR box or a vacuum antenna relay. Both units are equipped with "auto radio" antenna fittings and can be "patched" at will. The TR box is used for sideband and the relay for AM-CW-RTTY. The output of the relay or TR box feeds an MM-1 scope. On the output of the scope is another receiver-type female fitting.

All antennae used on the lower frequencies are fed with coax lines. Some of the runs are as long as 250 feet. These coaxes terminate in male antenna plugs that may be "patched" from the proper antenna to the output jack of the RF monitors. Similarly if the exciter of the older transmitter is disabled for some reason, either the output cable from the 32V2 or the output cable from the HT-32 can be plugged into the final amplifier grid input circuit and the entire system will work satisfactorily. This then means that we have a choice of exciters or a choice of transmitters in case of failure.

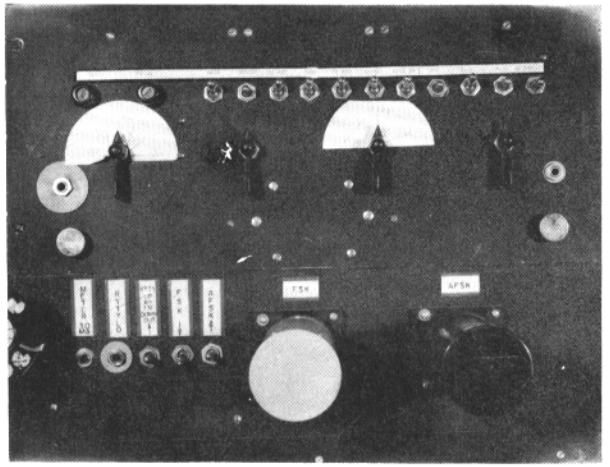
RECEIVERS

In the receiving position a 75A4, an SX-25 with a 2, 6 and 10 meter converter and an old National 81X that has been rebuilt into a very excellent receiver, are in use. These receivers have bridged inputs. The antenna feeds, with the exception of the 2 and 6 meter units, are all coax and looped through standard bridle loops with the remainder of the cable.

CONTROLS

The entire transmitting-receiving operation is controlled by a group of switches op-

FIG. 1
CONTROL
PANEL
(KW SET)



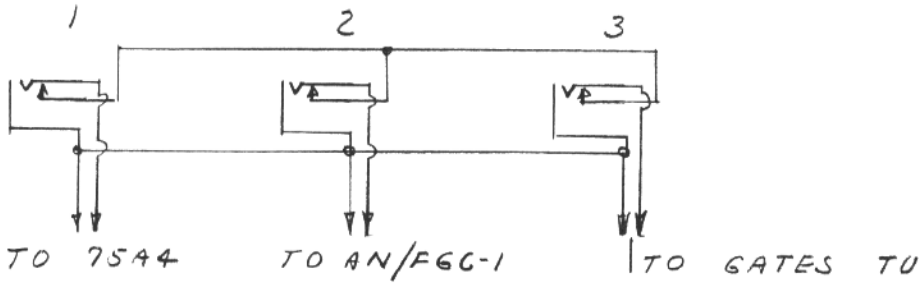


Fig 2.
DEe 9/15/59

erating 12 volt control relays from a DC power supply behind the control panel. Either a ringing key, a portable handswitch or a long board on the floor that operates a microswitch may be used to control the entire system. If you look at Figure 1, a picture of the control panel, you will see that there is a master switch and then individual controls for each receiver and function. Secondary control circuits are 110 volts AC, some shorting switches as required for the 32V2, and 12 volts DC for operating relays in the 12 volt equipment. I prefer to use DC relays with a small rectifier-filter primarily because their flux does not spread out and get into magnetic microphones. A resistor may be strapped directly across the relay coil as a surge suppressor. Above all things they are much quieter than the AC types.

A ½ KVA Sola regulator is installed permanently for equipment requiring stable voltages.

The old transmitter, although far out of date, is easy to operate. Rotation of a single switch on the main control panel turns the transmitter off, puts it into a standby position with filaments only, arranges it for CW, single sideband and teletype or, finally, in the last position, AM phone (Figure 1).

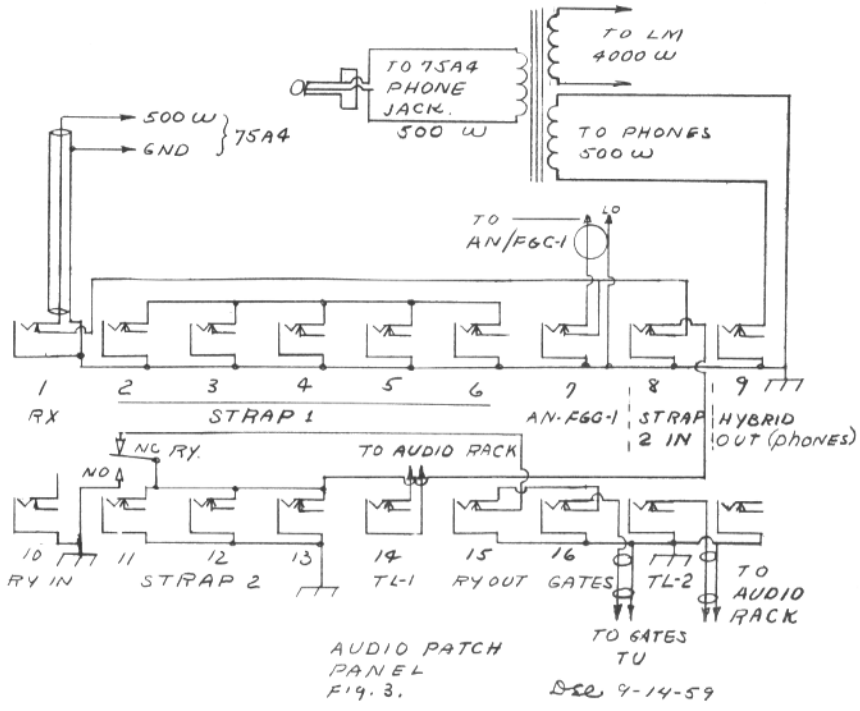
The row of toggle switches across the main control panel, left to right, are:

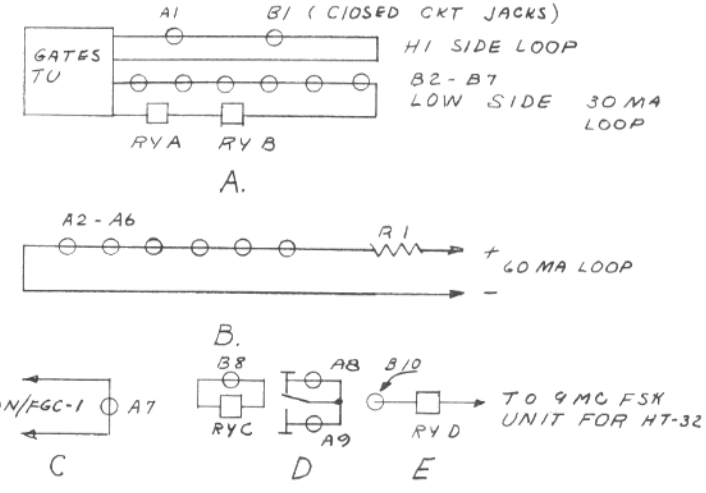
1. Main.
2. HT-32 switch. Up—controls from system.
   Center — off.
   Down — on all the time.
3. Receiving antenna relay.
4. 75A4 standby.
5. Transmitter antenna relay.
6. SX25 standby.
7. 81X standby.
8. RTTY — Gates TU shorting relay.
9. Teletype VFO. Up - controls from system.
   Center — on.
   Down — on.
10. LM frequency meter relay.
    Up — controls from system.
    Center — off.
    Down — on.
11. AN/FGC-1. Up — Controls from system.
    Center — on.
    Down — off.

In addition you will notice just above the A4 (Figure 9) that there is a jack marked "hybrid output." This jack does the following: When the plug feeding the hybrid is placed in the phone jack on the 75A4 receiver and headphones are plugged into the hybrid output, the third section, or input from the LM frequency meter, also goes into the same hybrid so that you hear either the LM frequency meter or the 75A4 receiver, depending upon which is working. The LM is operated from a relay as well as the receivers. The LM goes off when the transmitter comes on and the receiver comes on when the transmitter goes off. Separate relays are used for these controls. For sideband VOX operation the 75A4 "standby" and speaker are carried through the normal HT-32 circuits.

PATCHING SYSTEMS

I think the heart of a good operating group is probably the flexibility of the system. An example of the best oriented systems would be the broadcast industries and the communication industries. Let us then see what they would do with a problem that we are considering. First consider the output of a receiver such as the 75A4 that is to be fed to two terminal units with a possibility of a number of other equipments being placed in the system temporarily at a later date. Refer to Figure 2. Three jacks having normally closed contacts are connected together. In this theoretical circuit one jack goes to the 75A4 receiver, one to the AN/FGC-1 circuit and the third one to the Gates terminal unit. If you take a dead plug and place in No. 1 jack it kills the feed to the No. 2 and No. 3 jacks due to the lifting of the "normal." Then, let's assume another condition with the plug removed from No. 1. We would like to feed the AN/FGC-1 with some other source of signal than the 75A4 receiver. It is only necessary to use a patch cord from some other jack, place it in jack No. 2 and the feed will be accomplished by lifting the "normal" in jack No. 2. It is no longer connected either to the Gates terminal unit or the 75A4 receiver and can be fed with another signal. Similarly if we care to use a strap (which consists of a number of jacks paralleled) we can take the output of the 75A4 receiver, make a patch to each of the terminal units (jack No. 2 and jack No. 3) and measure the frequency with an audio





F/G. 4.
RTTY LOOPS
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type frequency meter, listen to the signal on headphones or using any other device that may be interesting. The advantage of this type of circuit is that the system is set up for normal operation with no patchcords. However, there are breaks in the system at all important points so that other equipments may be added or deleted. Referring to Figure 3, the circuit diagram of the audio patch panel on the receiving table, you will notice the following jacks:

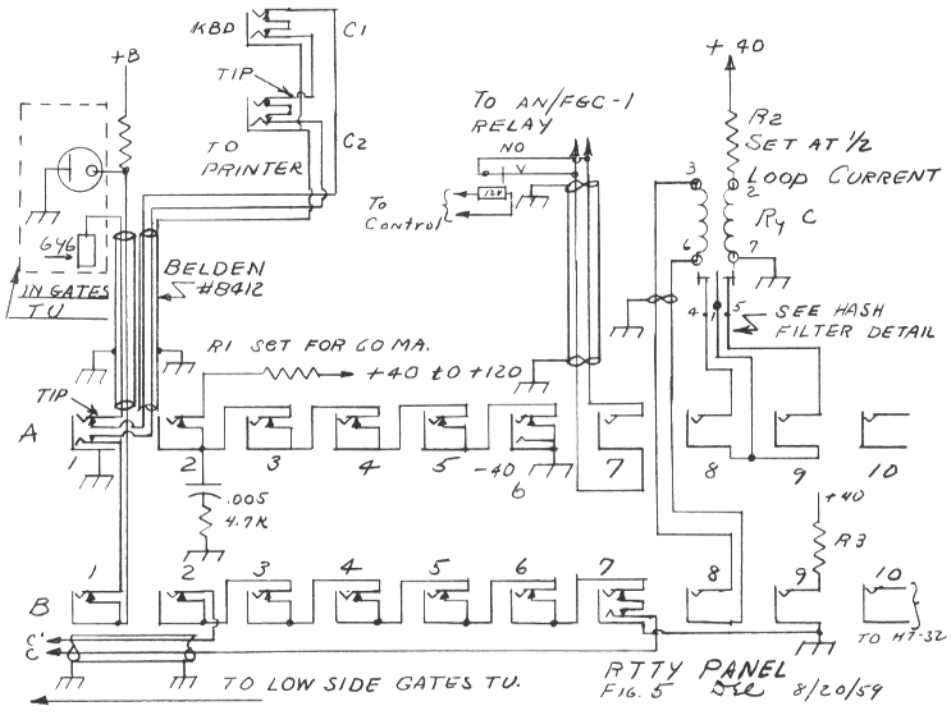
The output of the 75A4 which is normalled to two positions, jack No. 7, the input of the AN/FGC-1, and jack No. 8, which is the input of strap No. 2. Strap No. 1 consists of jacks 2, 3, 4, 5 and 6 wired in parallel. Jack No. 8, strap 1 input, is the input to the three jacks marked 11, 12 and 13. Jack No. 9 is the output of the hybrid transformer previously discussed. It is used for headphones. It differs from jack No. 1 in that jack No. 1 is the 500 ohm output of the 75A4 to work into the 500 ohm teletype filters, while jack No. 9 is the combined LM 14-receiver output. Now going on down to jacks 11, 12 and 13, strap 2, these three are in parallel so that you can plug the headphones into them and listen on the headphones without disturbing any other units. In addition if you use a direct reading frequency meter that reads 2125 and 2975 cycles it may be plugged into one of these jacks. The RTTY audio is picked up here, goes through the relay and appears at "relay out," jack No. 14. The input to the teletype terminal unit (Gates) is then plugged into the relay output jack. Jack No. 13 is a tie-line (TL-1) over to the audio rack. Tie-line (TL-2) is available on the audio rack. It is used for picking up circuits on the MM1 monitor and terminates in another jack.

The Gates type terminal unit has a relay on the signal line input that shorts the input during transmission intervals. If it is desirable to look at the monitoring scope while the transmitter is operating the toggle switch marked "teletype relay" is thrown downward, releasing the shorting relay. The reverse-normal-off switch on the Gates terminal unit is then thrown into such a position that no signal from the detectors reaches the grid of the keyer tube. This allows uninterrupted line current in the 6Y6 circuit for operating relays and teletype machines but still alows a visible trace on the scope for examining signal characteristics.

The AN/FGC-1 is handled in a slightly different way. Since the output relay of the AN/FGC-1, if open, allows the printer circuits to "run wild," a shorting relay placed across the operating relay contacts right at the jack panel does the same function for the AN/FGC-1 as for the Gates terminal unit. In this case the shift indicator and bias meters are available for On-Air system checks without causing any interruption in the printer circuits. In using the AN/FGC-1, I DO NOT use a reversing switch in the polar relay circuit. A two plug audio-type cord, when inserted between the tube keyer output and the relay input, can be reversed to provide the necessary relay reversal. This means that ony two wires from the polar relay need be carried over to the other panels. In my case I use Belden type 8412 cable which is really a microphone cable with two conductors and a shield. I use one conductor as the center lead of the relay and the other conductor as the high side and leave the standard filters in the relay.

TELETYPE OPERATION

Two separate machines, having different coil currents, are used in the system at this station. A 30 ma current loop is used to print the 26 machine. It is supplied by the Gates type terminal unit. In addition a separate 60 ma loop supplied by a 40 volt selinium rectifier is used to operate the 14 typing reperf. Polarizing voltage for the polar relay used to key the 60 ma loop and the release magnet voltage for the TD as well as the actual coil current for the 14 machine all come from the same power supply. See Figure 6 for the circuit. This is an extremely husky supply, it could be a 125 volt supply such as the AN/FGC-1 supply, or any other unit capable of furnishing the current. Again referring to Figure 4, you will notice that the Gates terminal unit in the block diagram has both a high side and low side loop. This was made necessary by the fact that the Gates unit will print a single 30 ma machine in the cathode, but due to extremely high transients only the one machine can be used in the cathode before serious degeneration occurs. Therefore the printer magnets for the 26 machine are placed in one of the jacks identified by A-1, B-1, marked "high side of the Gates terminal unit" (Figure 5). You will also notice that jack A-1 has a very peculiar group of connections going to a pair of



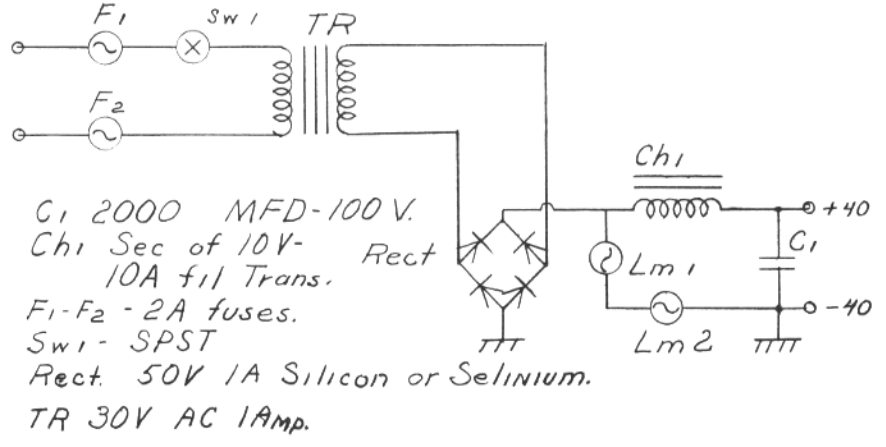


FIG 6.
DC POWER SUPPLY
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remote jacks. These jacks are arranged in such a way that the teletype machine is connected with a three terminal cable, preferably two wires and a shield. The cable used in my installation was Belden No. 8412. The use of this cable allows the carrying of a ground to the machine although either the keyboard or the printer circuits are hot above ground. If you have a copy of my article in August and September, 1956 RTTY you can locate the cathode or return circuits where wires C' and C connect. These are in the low side of the 6Y6 tube and have two relays for the FSK and AFSK unit in series permanently, then the jacks in series (Figurse 4 and 5). Now let us see how this system works. If the 26 machine is plugged into jack A-1, C-1 or C-2 it will print normally and anything printed on the machine will interrupt the circuit through the 6Y6 tube. Since the AFSK and FSK relays are permanently in series they will control the frequency shift in the transmitters. In order to print on the 14 typing reperf, relay C which appears at jack B-8, can be patched into any jack numbered B-2 through B-6. Any keying of the 26 machine will therefore operate relay C. Relay C is supplied with polarizing current, controlled by R-2 and set at half the loop current. The output of relay C appears at jacks 8 and 9, one of which is the mark, the other space. Either one of these may be patched to jacks numbered A-2 through A-5. The printer magnets of the 14 machine are then patched into jack A-2 through A-6. Output of relay C will therefore appear on the printer magnets of the 14 machine. Next, the 14 TD release coil is patched into jack No. B-9 and will operate when actuated with a switch on the TD itself. The keying terminals of the 14 TD may be patched into any jack, B-2 through B-6. Also the keyboard of the 14 machine may likewise be patched into any jack, B-2 through B-6. This means that if the 14 machine is operating you can type on the 26 machine and through relay C it will print on the 14 machine. You can type on the 14 machine and it will print the 26 machine directly in the loop or through the relay C, will print itself. Then, the TD being in the same loop, will also print on the 14 and 26 machines, both keying circuits in addition will operate the transmitter frequency shift keying relays. Now if it is desired to pre-punch tape without affecting the 26 loop, remove the patch from relay C (either A-8 or A-9) from loop A and place the keyboard plug from the 14 machine in this loop. Then it will print and punch local copy. For repeat local copy the TD keying plug may also be used in the same loop.

To operate the system from the AN/FGC-1 a patch can be placed from jack A-7 to any jack in the B current loop. Note that the output terminals of the AN/FGC-1 are controlled by the system relay where the input terminals on the Gates terminal unit are controlled. This is a deliberate arrangement so that the shift indicator and bias meters of the AN/FGC-1 can be used on the transmitter locally. Also if you care to print from the transmitter directly rather than from the keyed loop, the output jack of the AN/FGC-1 (A-7) may be patched to any of the jacks in the 14 machine loop, A-2 through A-5.

In the drawing of relay C, the hash filter is not shown. See Figure 7. It is shown separately in Figure 7 to reduce complication of drawing No. 5.

A separate current loop for the 26 machine could easily have been used. Unfortunately the system "grew" and due to the pressure of time it was advisable to use the straight current loop from the Gates terminal unit to supply both the keying relays and the 26 machine. In case you are unable to locate a circuit diagram of the original tuning unit, Figure 8 shows the low side circuit diagram.

A couple of changes have been made over the original Gates circuit. Biases have been added by a voltage doubling rectifier on the filament circuit to provide bias to the terminal unit, and additional resistors are switched in for mark only or space only copy that do help the operation.

Also note that the AN/FGC-1 is used as a keyer—with no local battery supplied. It is necessary to remove the +125 TLG supply.

ADDITIONAL USES

In addition to the functions discussed above, this system is extremely versatile. A Magnecord tape recorder is installed permanently in one of the rack panels. The speech input circuit consists of a transistorized microphone preamplifier, (for dy-

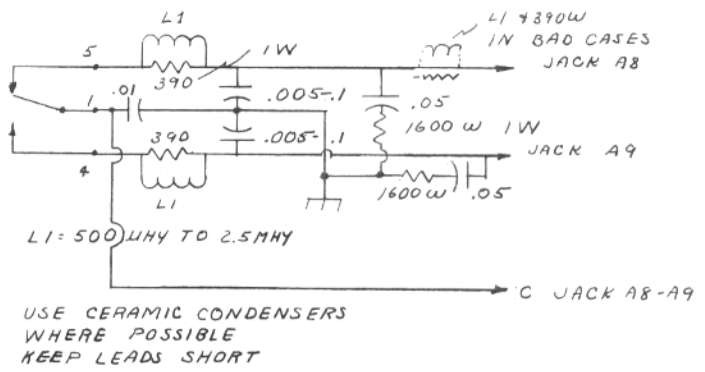

FIG. 7 - HASH FILTER
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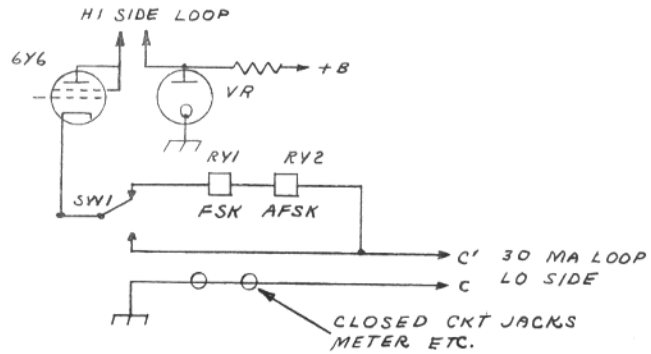


GATES TU LOW SIDE
RELAY CKT.
FIG. 8 Dee 9/16/59

namic mikes) feeds into one channel of a five channel mixer. A high fidelity brush BR2S sound pressure standard microphone feeds into another channel of the same amplifier. The other three input channels can be patched to the required positions for mixing either the output of the tape machine external signals, remote mikes or whatever is necessary. The tape machine input is bridged across the output of this preamplifier with a pad so that no switching is necessary when it is used. The output of the mixer panel also operates two 40 watt line amplifiers for driving the 250TL modulators, speakers and audio for all transmitters through proper pads. If one of the inputs to the mixer panel is patched to the output of the audio shift keying panel, then you may record the AFSK signal on magnetic tape as it is keyed by the DC loop. A nice combination is to use 2 or 3 minutes of straight teletype signal such as tests, CQ, RY or any choice, then a CW sign. This is done by putting the 14 typing reperf in its normal loop and keying it with the 14 TD. First print two lines of the material that you want to transmit automatically, then feed this into the 14 TD and turn both machines on. The 14TD then transmits the signal that operates the reperf unit two lines behind what is being transmitted and you get a continuous punched tape of the information you have typed, without retyping. Now, if while you are running this continuous tape, which also keys the AFSK keyer, the output of the AFSK keyer is taken through the mixer amplifier to the Magnecord recorder, you get the teletype signals directly on the Magnecord. To further implement the operation, one of the DC jacks on the low end of the 30 ma loop can have a normal hand key plugged in. This hand key is kept closed. After a few minutes of teletype signals the 14 TD can be shut off and the hand key used to insert a standard CW frequency shift signal in place of the teletype signal, to meet the legal sign requirements. You end up with a few minutes of teletype, a frequency shift hand keyed sign, and then a few more minutes of teletype. For interference checks and other problems this is an ideal system as it is not necessary to use the RTTY after the tape is once made. I use Cousino endless reels on the Magnecord that repeat themselves.

The next operation that is possible with this system is to take the standard hand key, record on the Magnecord in such a way that when the hand key is open the space signal occurs (2975 cycles). When the key is cosed the mark signal occurs (2125 cycles.) Now if this keying is fed into the Magnecord it gives you a very good control so that the output of the recorded tape with the CW on it can be fed to the AN/FGC-1 or to the Gates terminal unit. The output of both units are arranged so that a polar relay may be PATCHED in the circuit RY-C (Figure 5). Then to key the transmitter on straight CW the normally closed contacts of the relay are patched directly to the keying jack of the transmitter you care to use. This means that if you need a continuous CW signal to transmit CW information or signals with your call sign inserted, you then can use the teletype system. The keying is extremely clean, the character spacing being as good as the original. I use a 10 foot loop of tape on the Magnecord for short calls and record the calls of the stations that I am going to call plus my own sign on the loop and use it as an automatic calling device. One warning is in order—*don't let these automatic devices run themselves into the ground.*

CONCLUSION

As a general rule, in the application of teletype equipment, machines do not operate well in series. It is much better to use polar relays for each machine if perfect copy is needed. Also, more than one machine in the cathode circuit of the keyer tube is not a good policy. Figure No. 11 is a sketch of the transient voltage existing across the coils of the 26 machine. This transient voltage affects everything and can cause considerable distortion of the signals. Fortunately placing the printer coils in the positive lead or using a separate supply as RTTY has suggested, and placing the machine at the ground end of the supply, both eliminate the problem. Being in a hurry at the time the system was revised, the printer coils were placed in the positive high voltage but a three terminal cable was used which grounded the case of the machine so that the danger of shock was reduced.

For now, 73 to everyone. Let me hear some "sharp operating" from fellows using similar systems.

Dave W9DPY

FIG. 9
REC.
PATCH
PANEL
(See Fig. 3)

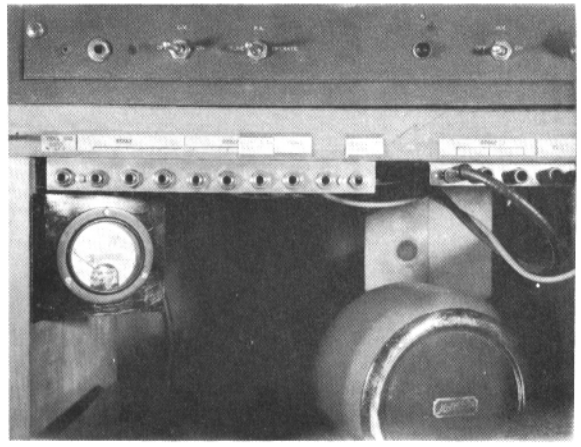
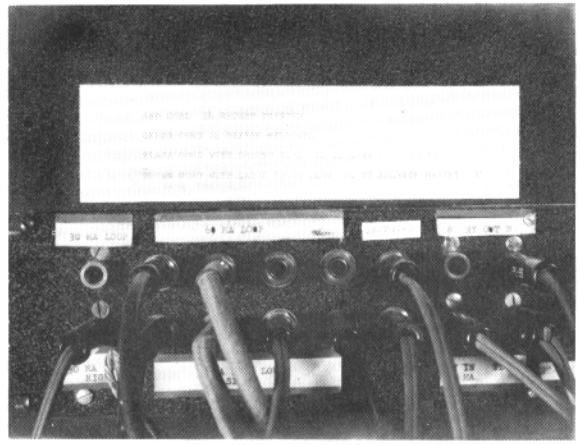


FIG. 10
RY
PATCH
PANEL
(See Fig. 5)



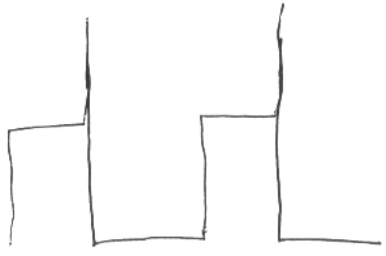


Fig. 11